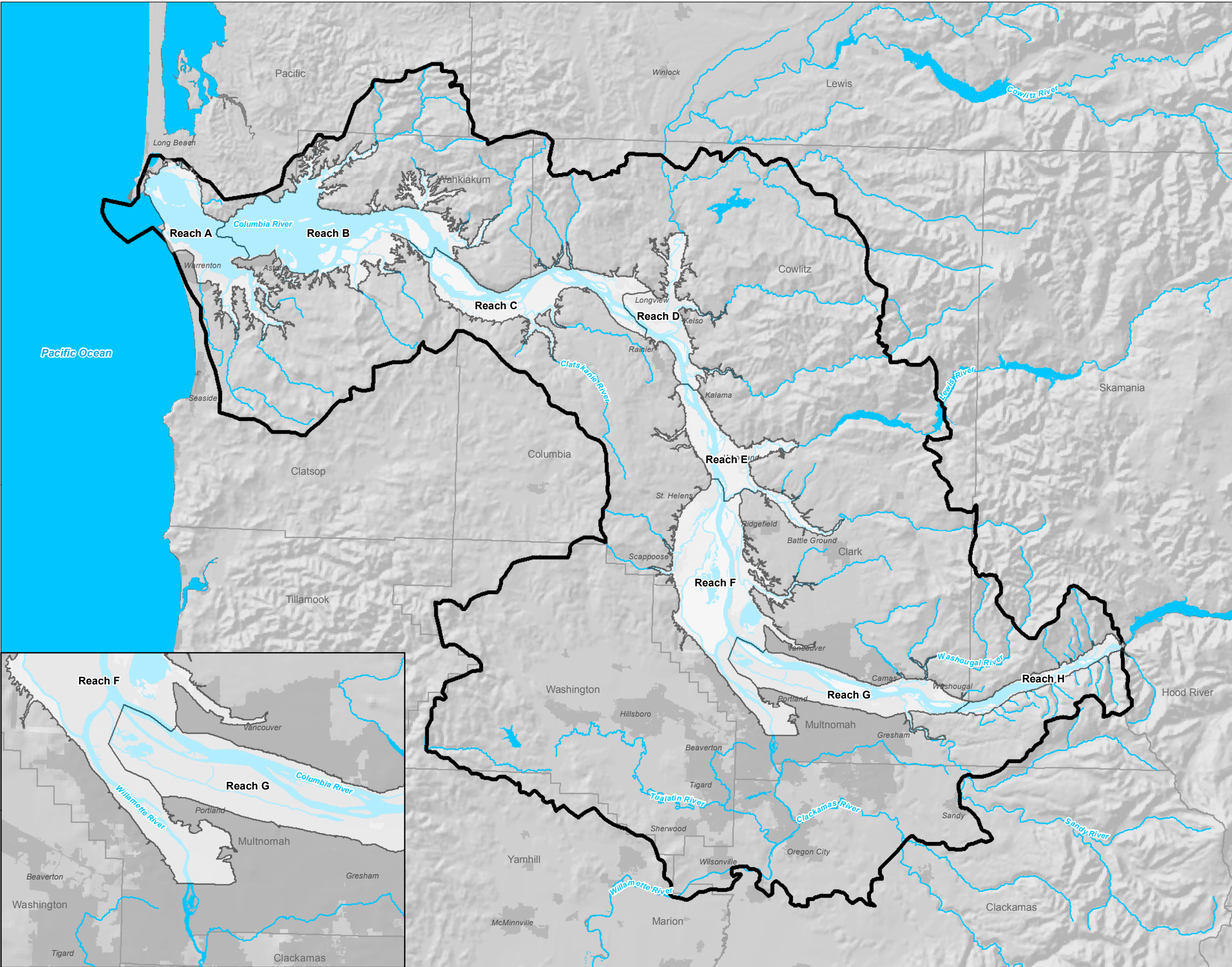
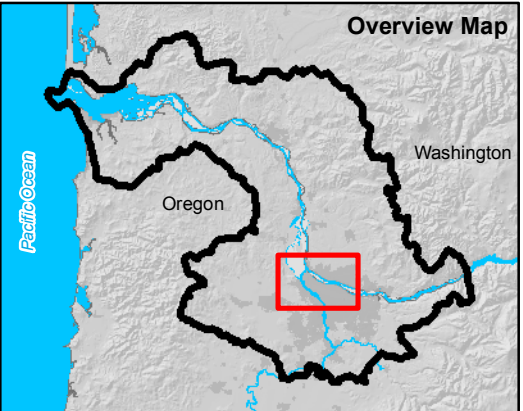


## Figures



**FIGURE 1**  
**River Reaches**  
Lower Columbia River Estuary Partnership

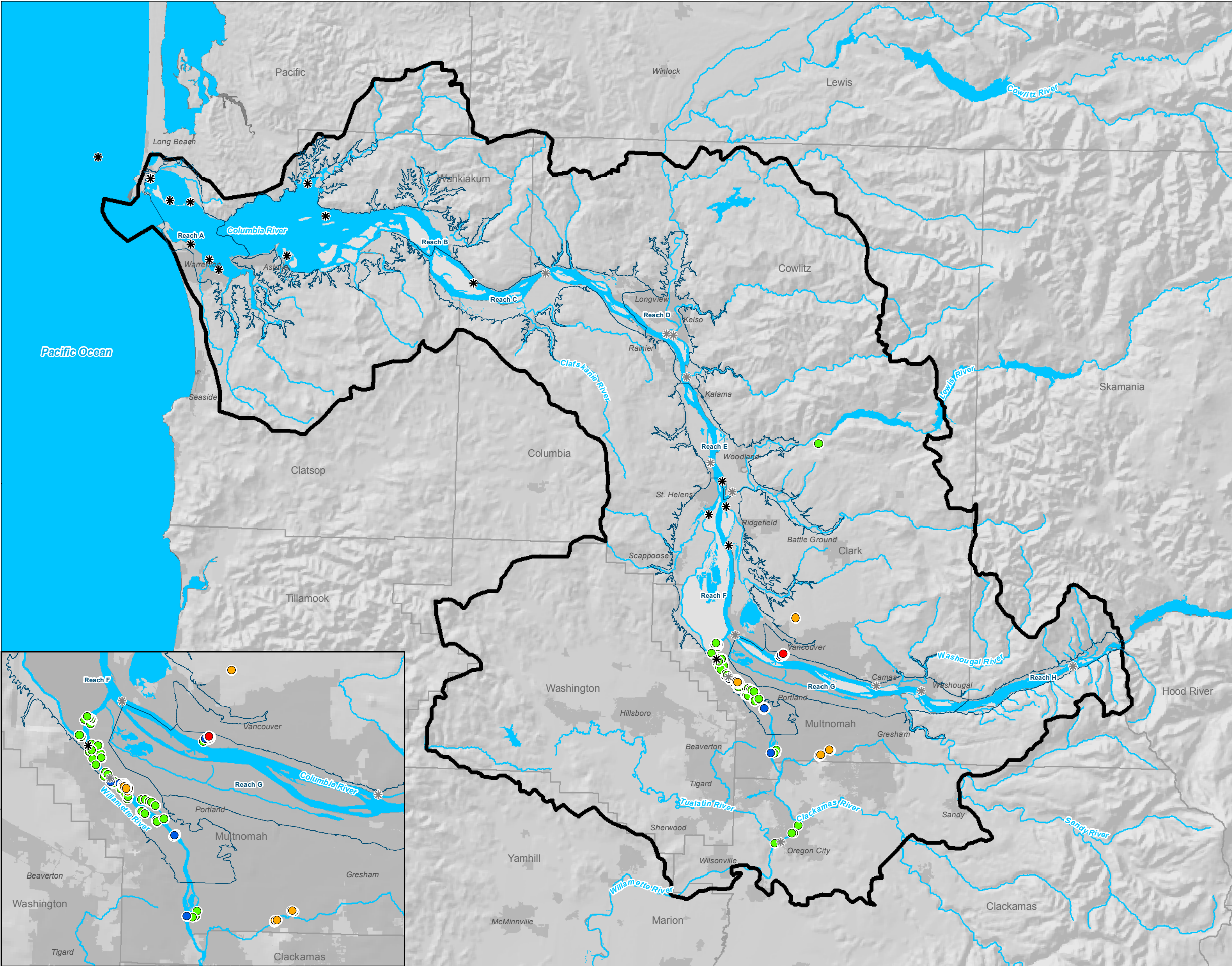
- LEGEND**
- River Reaches
  - Study Area
  - Counties
  - City Limits
  - Watercourses
  - Waterbodies



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG

**GSI**  
Water Solutions, Inc.





**FIGURE 2**  
**Copper in Water**  
Lower Columbia River Estuary Partnership

**LEGEND**

**Sample Location, Grab**

- Detect
- Non-Detect

**Copper (ug/L)**

- 0 - 3.3<sup>1</sup>
- 3.3 - 10<sup>2</sup>
- 10 - 1,300<sup>3</sup>
- >1,300

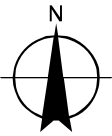
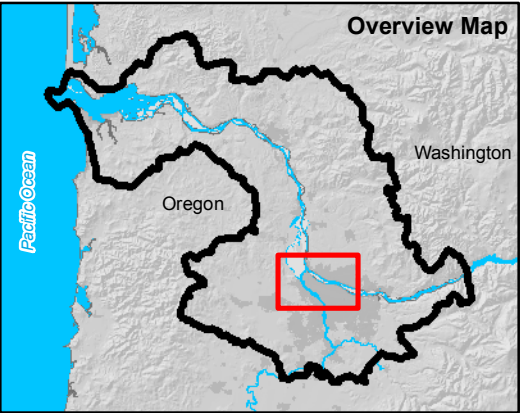
**Proposed Monitoring Sites (1999)**

- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

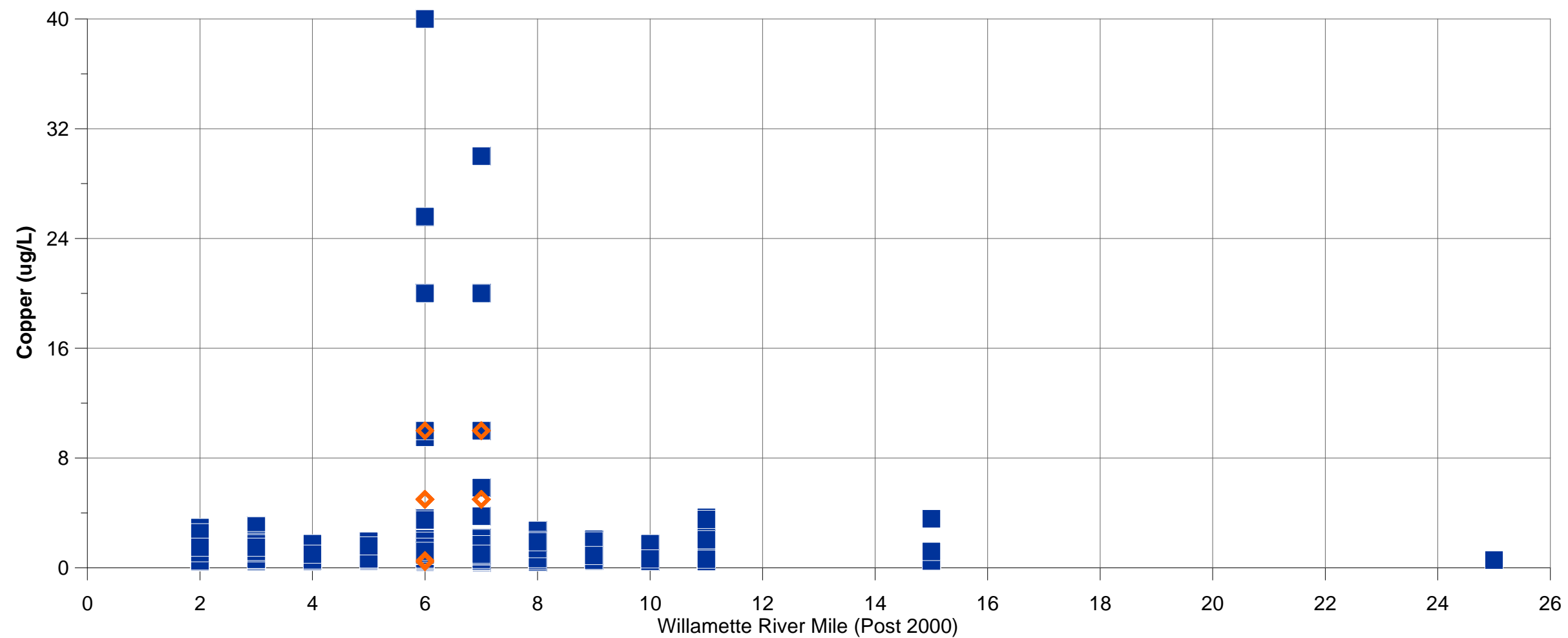
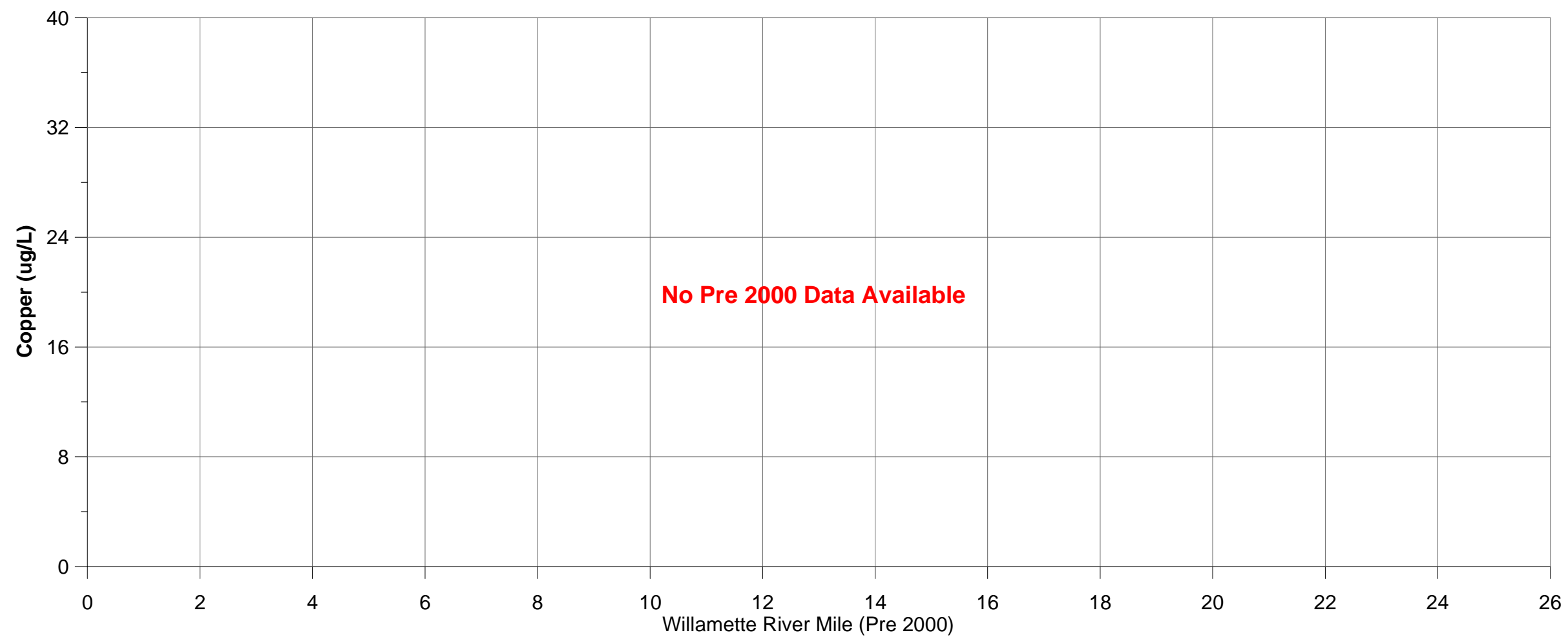
- ▭ Study Area
- ⋈ River Regions
- ▭ Counties
- ▭ City Limits
- ~ Watercourses
- ~ Waterbodies

**NOTES**  
1. Freshwater chronic based on a hardness of 25 mg/L  
2. Natural break  
3. National Recommended Water Quality Criteria for Priority Pollutants Water and Organism Human Health Consumption



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG



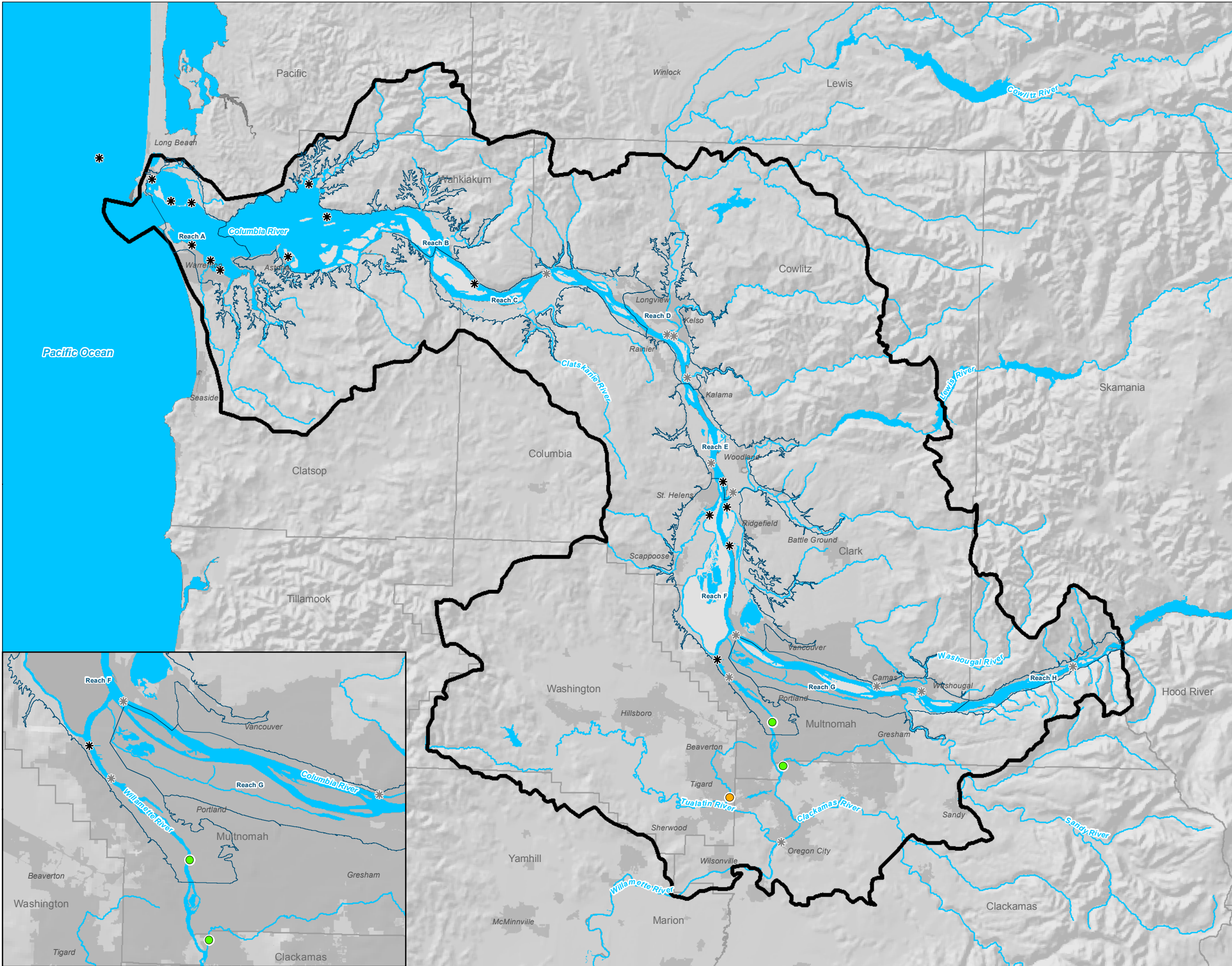


**Note:**  
River miles are approximate  
All data in Reach F  
Date: August 2011





**FIGURE 4**  
**Chlorpyrifos in Water**  
Lower Columbia River Estuary Partnership



**LEGEND**

**Sample Location, Grab**

- Detect
- Non-Detect

**Chlorpyrifos (ug/L)**

- 0 - 0.02<sup>1</sup>
- 0.02 - 0.041<sup>2</sup>
- 0.041 - 0.083<sup>3</sup>

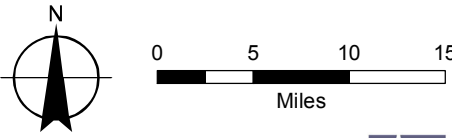
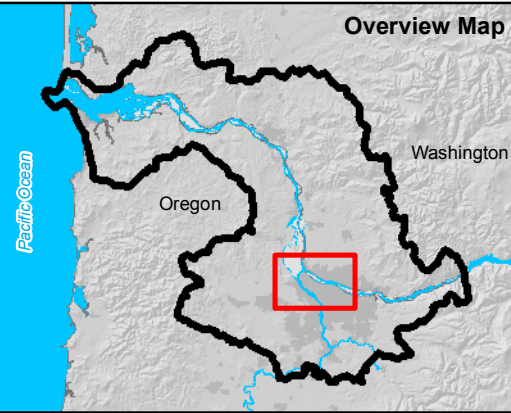
**Proposed Monitoring Sites (1999)**

- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

- ▭ Study Area
- ⬭ River Regions
- ▭ Counties
- ▭ City Limits
- ~ Watercourses
- ~ Waterbodies

- NOTES**
1. Natural break
  2. Chronic Freshwater National Recommended Water Quality Criteria
  3. Chronic Freshwater National Recommended Water Quality Criteria

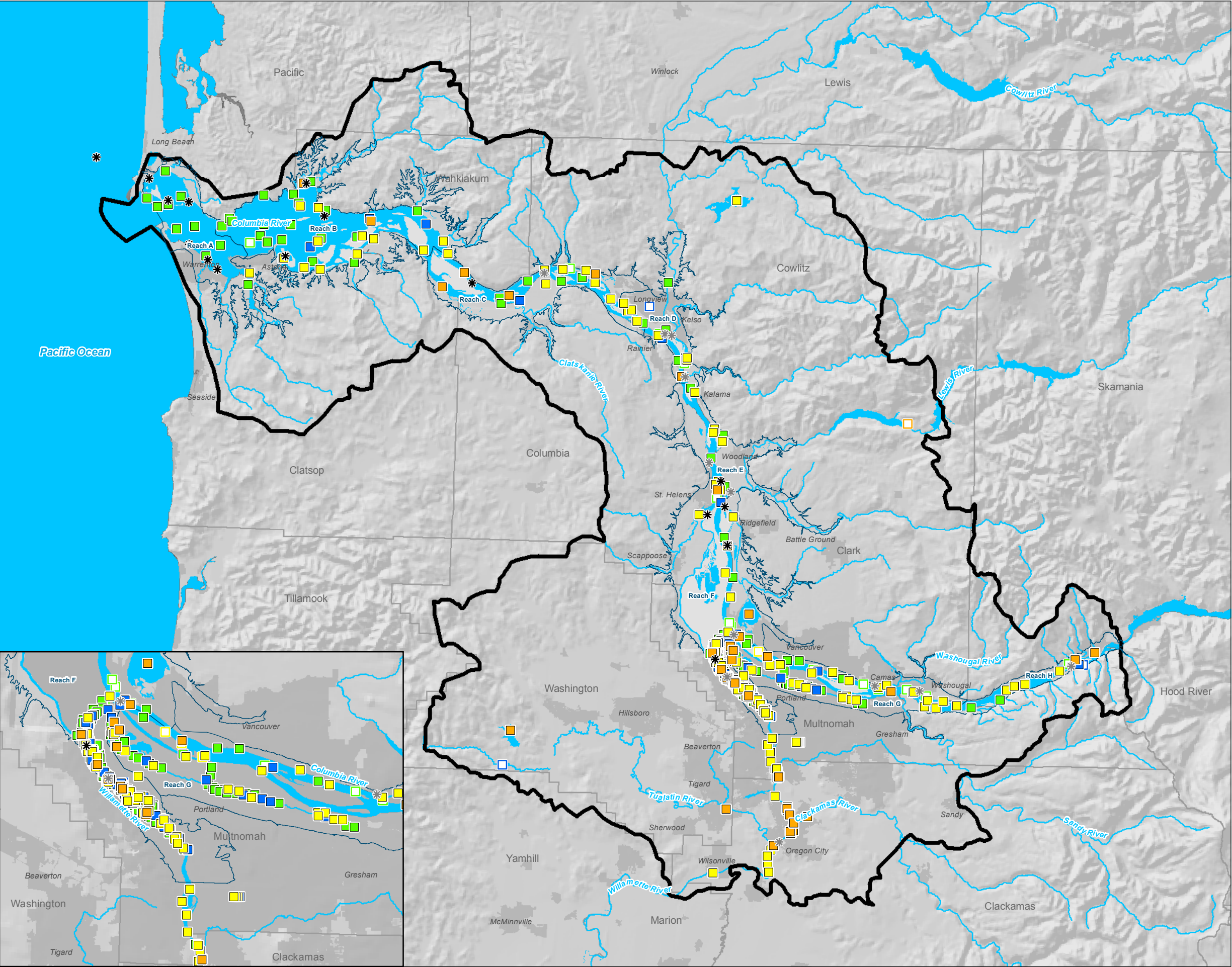


**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG





**FIGURE 5**  
**Mercury in Biological Samples**  
Lower Columbia River Estuary Partnership



**LEGEND**

**Sample Location**

- Detect
- Non-Detect

**Mercury (ng/kg)**

- 0 - 0.049<sup>1</sup>
- 0.049 - 0.074<sup>2</sup>
- 0.074 - 0.32<sup>3</sup>
- > 0.32

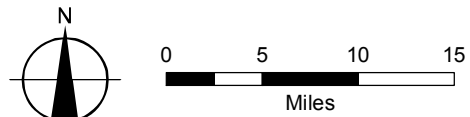
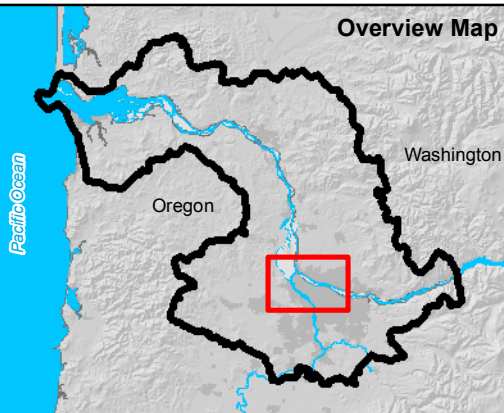
**Proposed Monitoring Sites (1999)**

- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

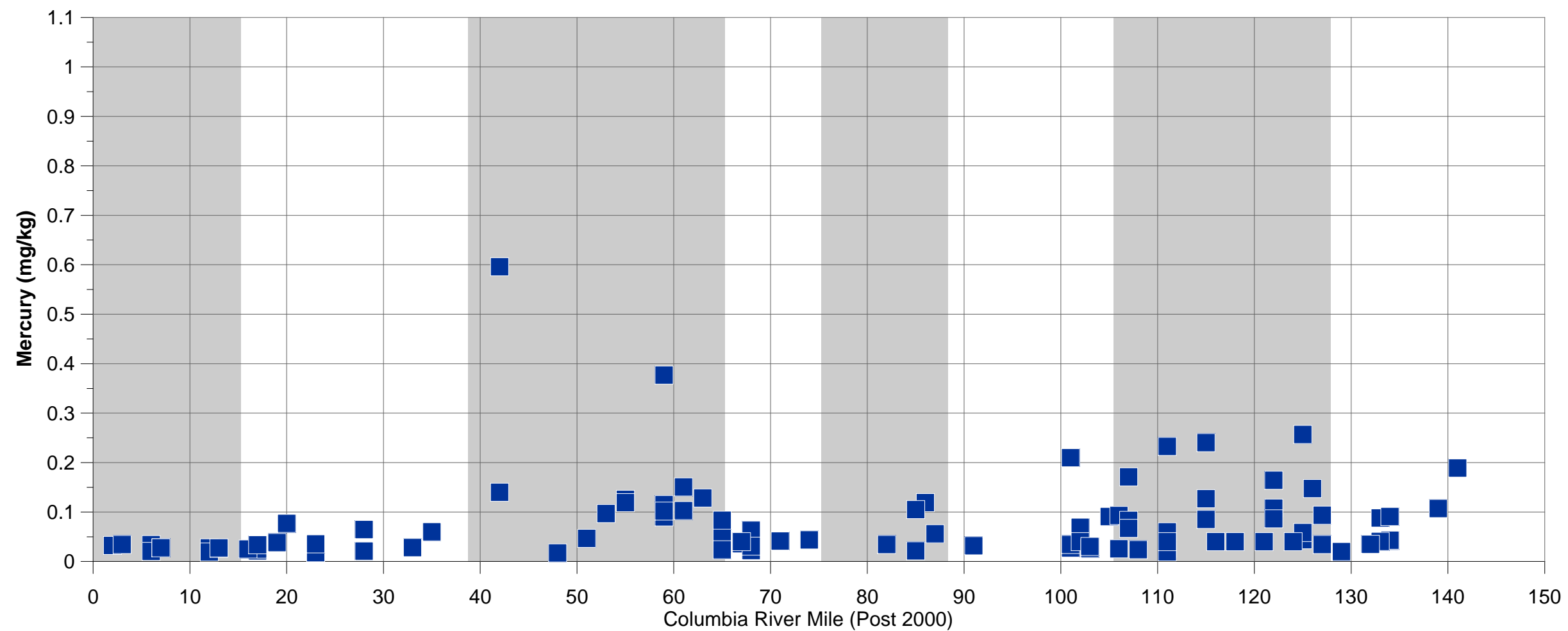
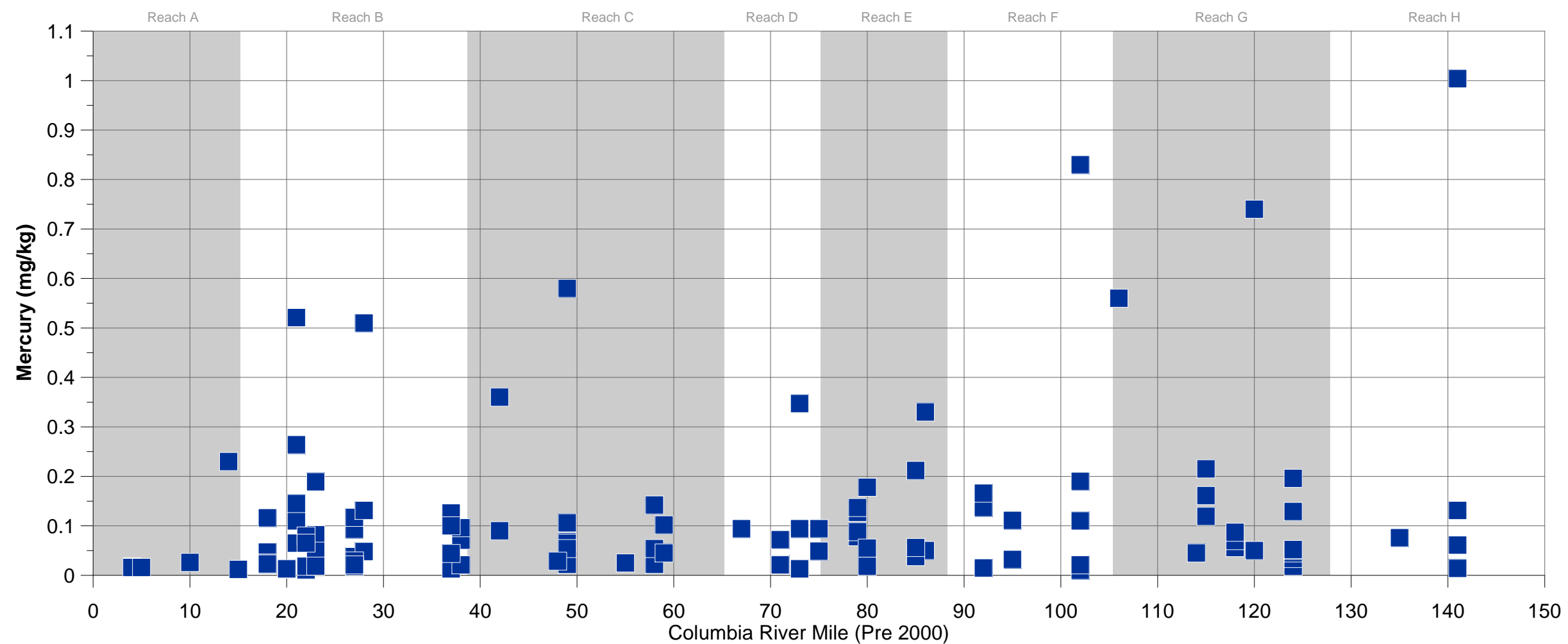
- ▭ Study Area
- ⌘ River Regions
- ▭ Counties
- ▭ City Limits
- ~ Watercourses
- ~ Waterbodies

- NOTES**
1. DEQ Bioaccumulation Acceptable Tissue Level Shellfish ingestion
  2. DEQ Bioaccumulation Acceptable Tissue Level Wildlife Bird
  3. Portland Harbor Tribal Adult for Fish Consumption



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG





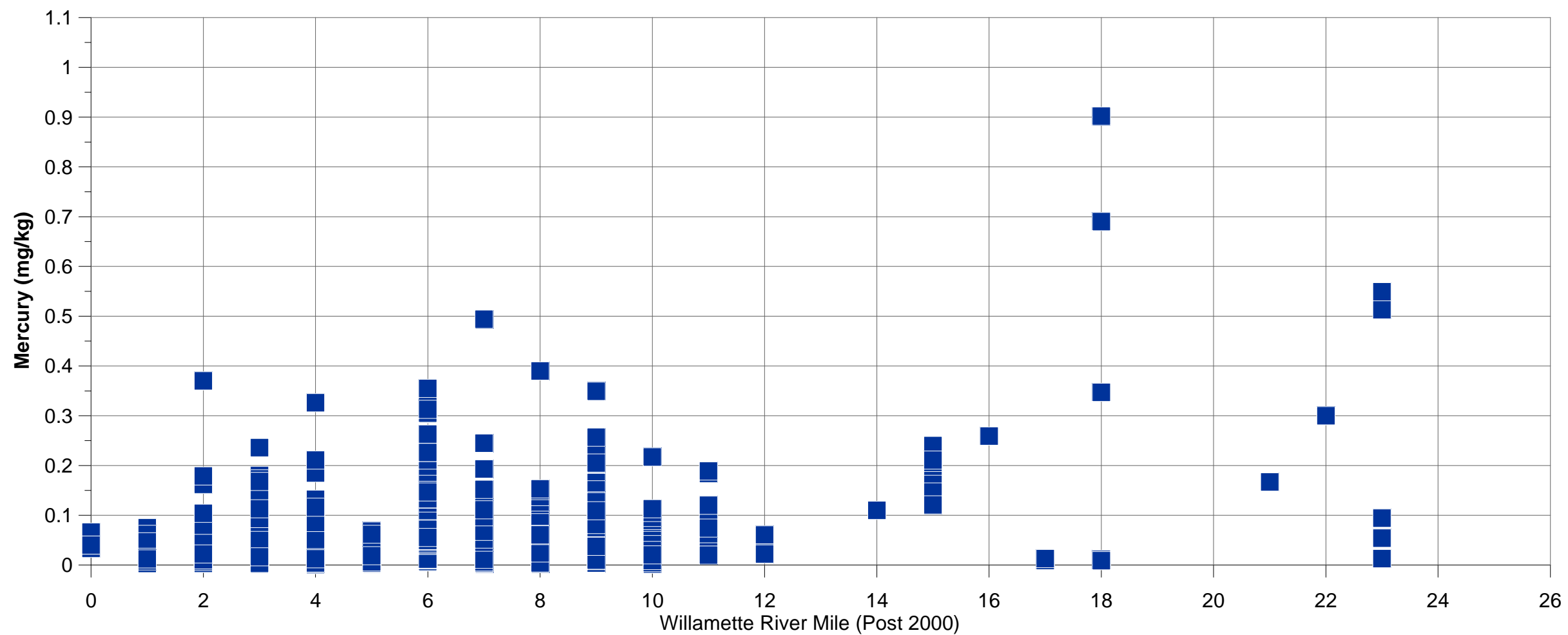
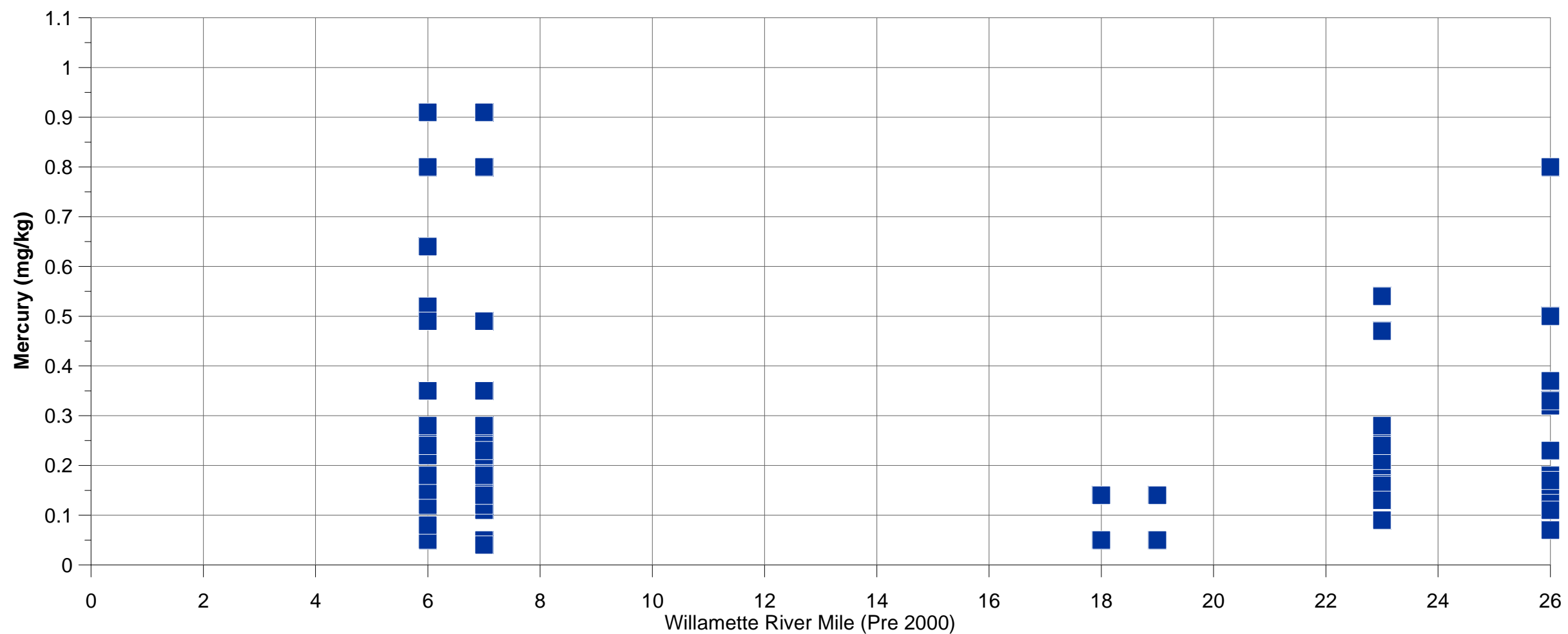
**FIGURE 6**  
Mercury in Biological Samples  
on the Columbia River  
Lower Columbia River  
Estuary Partnership

**Legend**  
■ Detect  
◆ Non-Detect

**Note:**  
River miles and reaches are  
approximate  
Date: August 2011



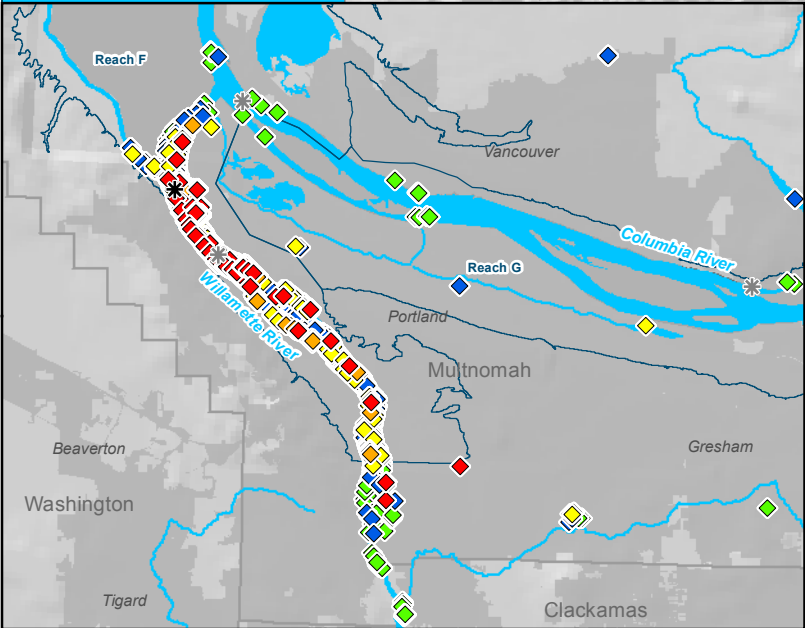
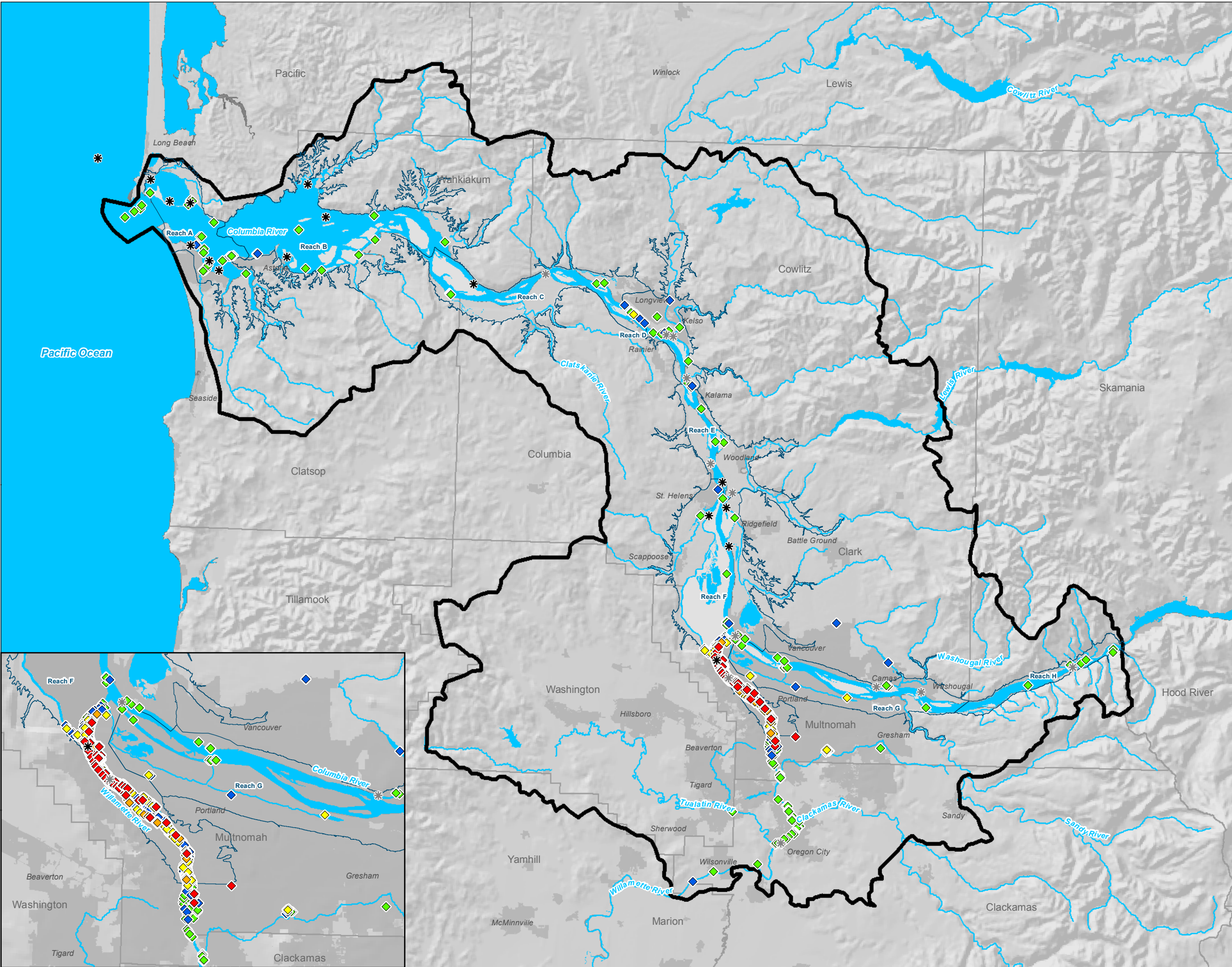
**FIGURE 7**  
 Mercury in Biological Samples  
 on the Willamette River  
 Lower Columbia River  
 Estuary Partnership



**Note:**  
 River miles are approximate  
 All data in Reach F  
 Date: August 2011







**FIGURE 8**  
**Total PAHs in Sediment Samples**  
Lower Columbia River Estuary Partnership

**LEGEND**

**Sample Location**

- ◆ Detect
- ◇ Non-Detect

**Total PAHs (ug/kg)**

- ◆ 0 - 465<sup>1</sup>
- ◆ 465 - 4022<sup>2</sup>
- ◆ 4022 - 22800<sup>3</sup>
- ◆ 22800 - 44792<sup>4</sup>
- ◆ > 44,792

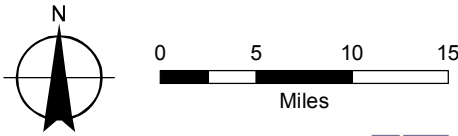
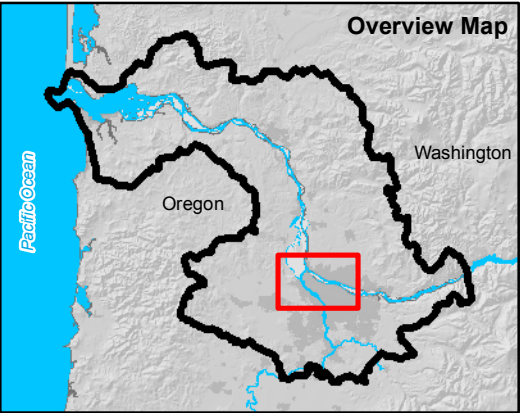
**Proposed Monitoring Sites (1999)**

- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

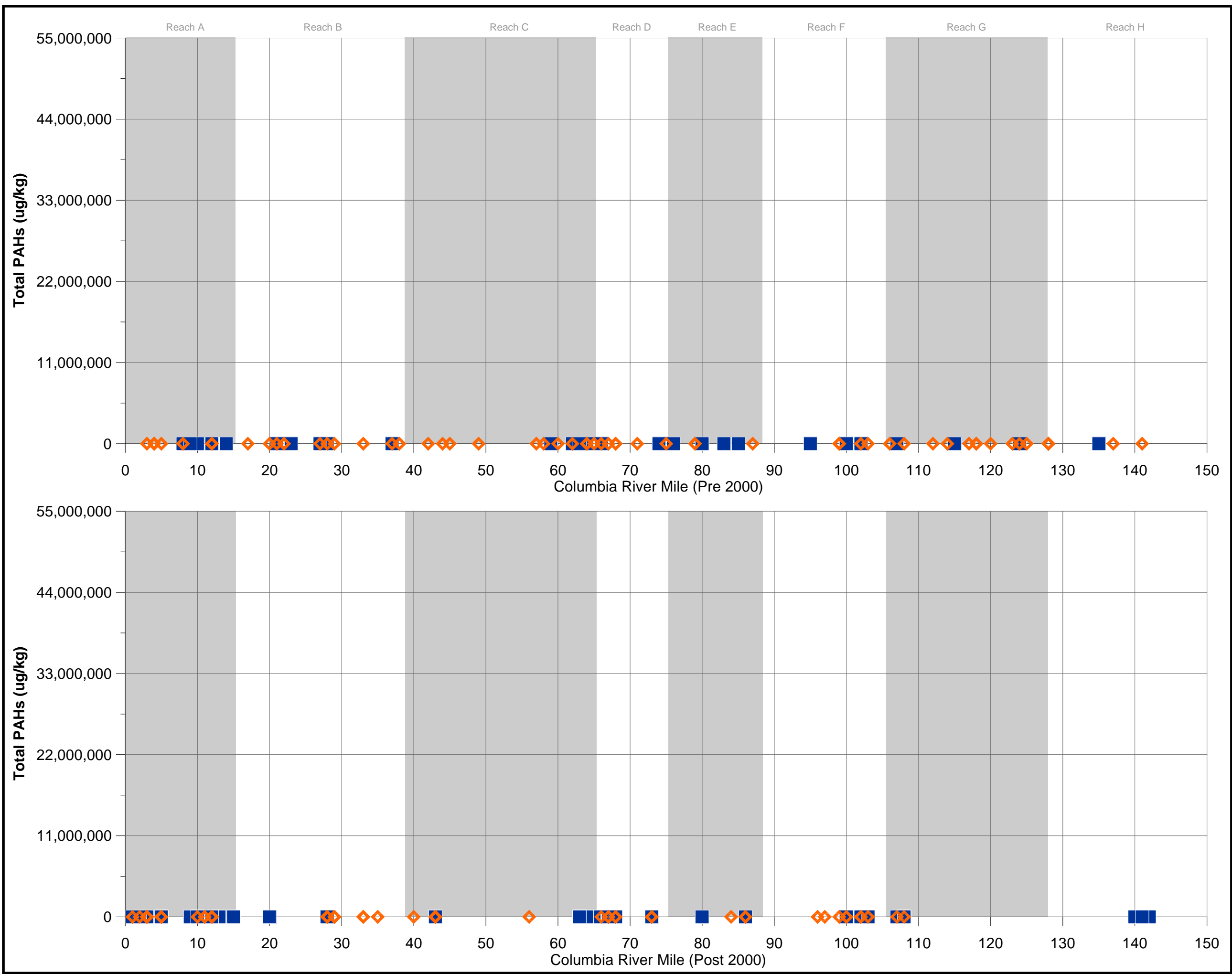
- Study Area
- River Regions
- Counties
- City Limits
- Watercourses
- Waterbodies

- NOTES**
- Natural break
  - DOE Sediment Guideline Effects Range Low (ERL)
  - Portland Harbor Focused Preliminary Remediation Goal Eco Benthic Probable Effects Concentration Sediment Quality Guideline
  - DOE Sediment Guideline Effects Range Medium (ERM)



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG





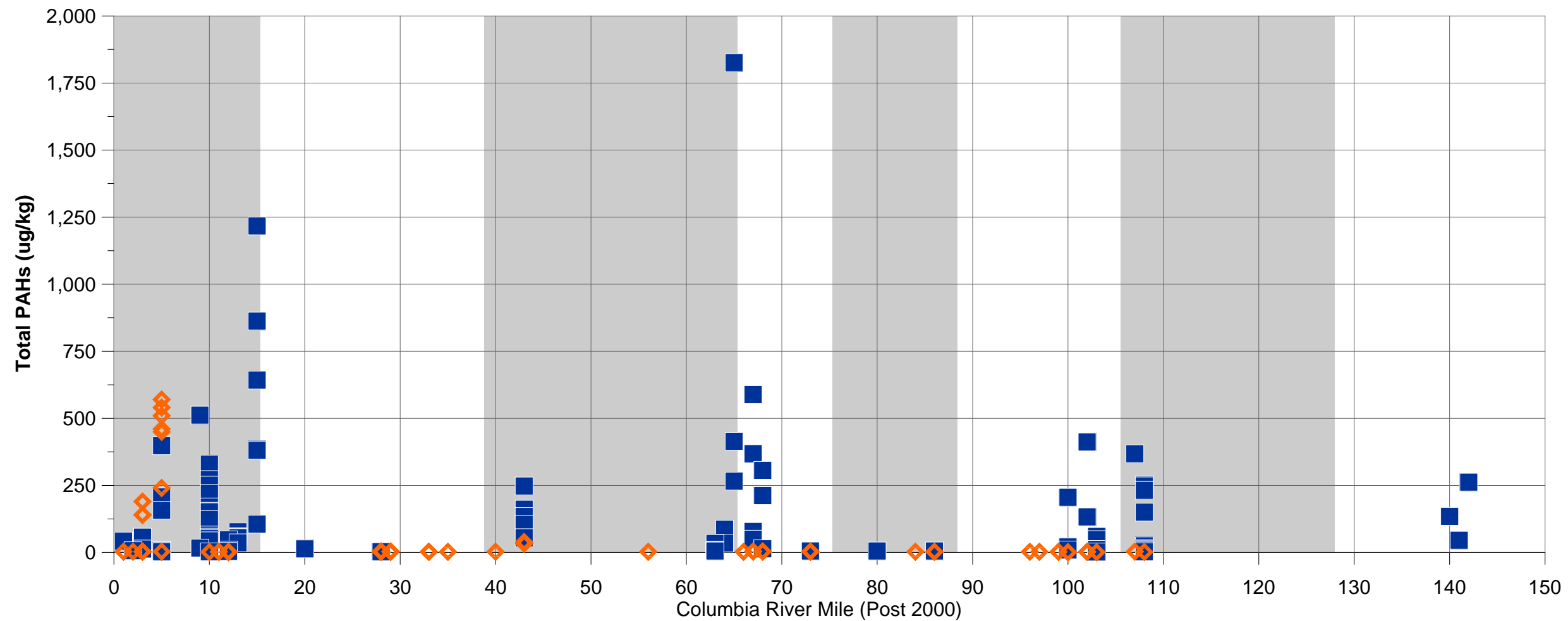
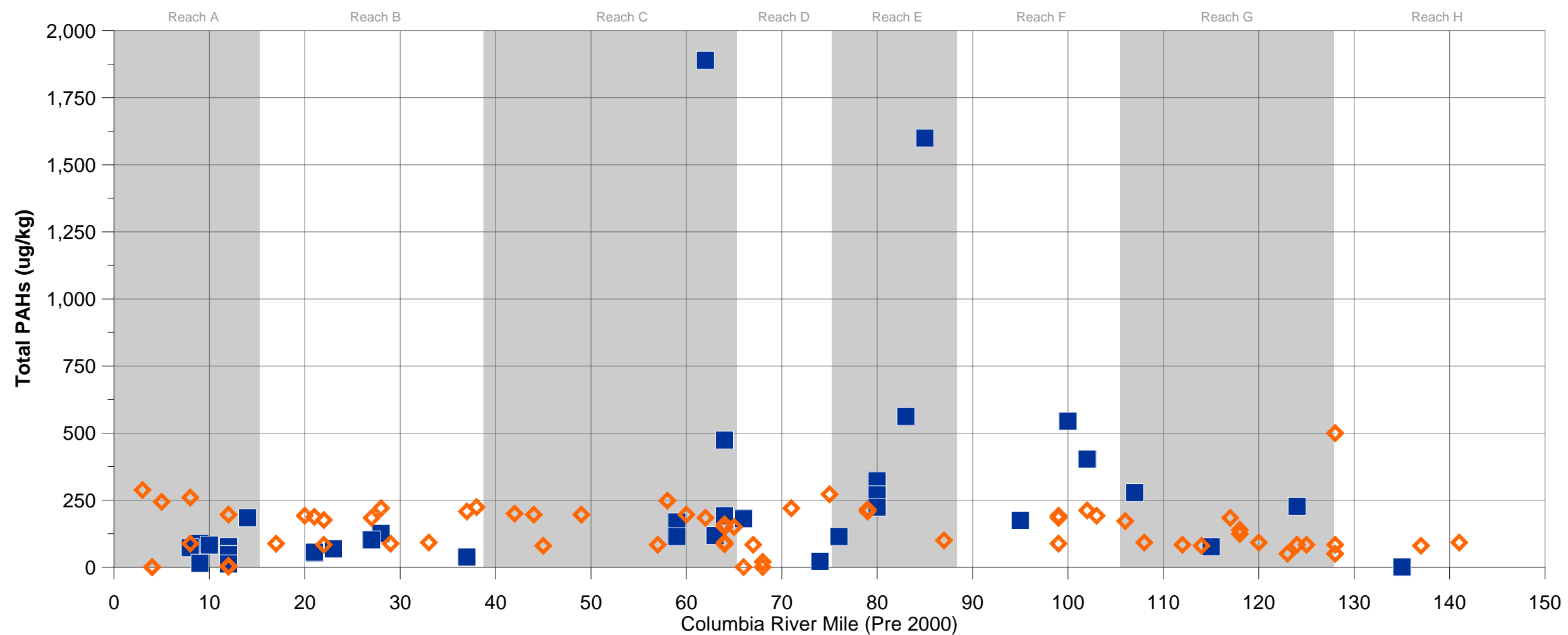
**FIGURE 9a**  
Total PAHs in Sediment Samples  
on the Columbia River  
Lower Columbia River  
Estuary Partnership

**Legend**  
Detect  
Non-Detect

**Note:**  
River miles and reaches are  
approximate  
Date: August 2011







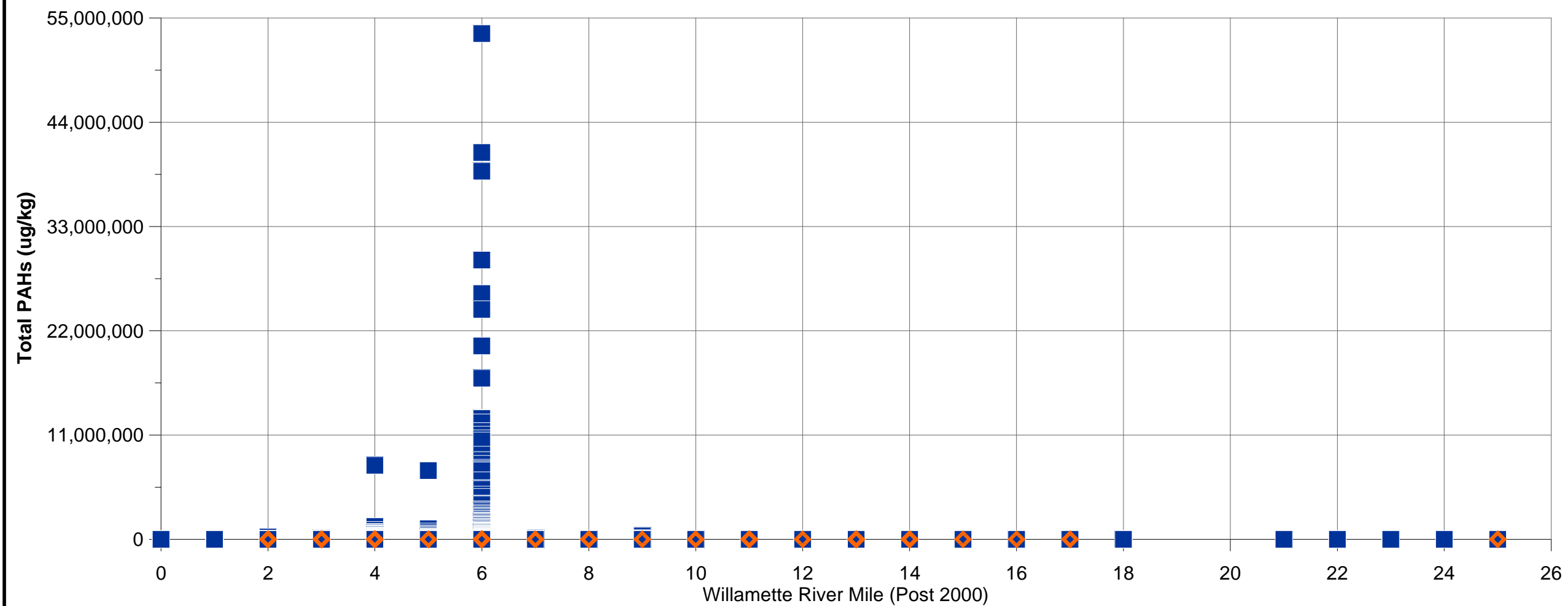
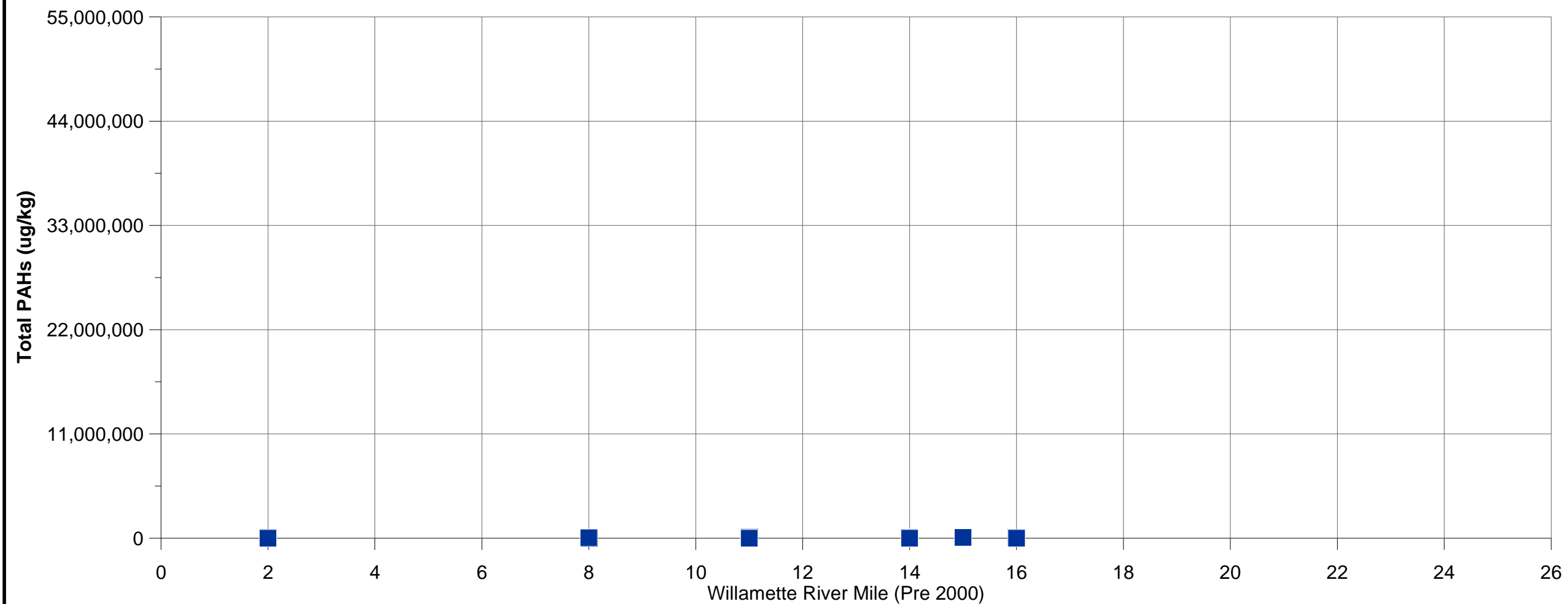
**FIGURE 9b**  
 Total PAHs in Sediment Samples  
 on the Columbia River  
 Lower Columbia River  
 Estuary Partnership

**Legend**  
 ■ Detect  
 ◇ Non-Detect

**Note:**  
 River miles and reaches are  
 approximate  
 Date: August 2011



**FIGURE 10a**  
 Total PAHs in Sediment Samples  
 on the Willamette River  
 Lower Columbia River  
 Estuary Partnership

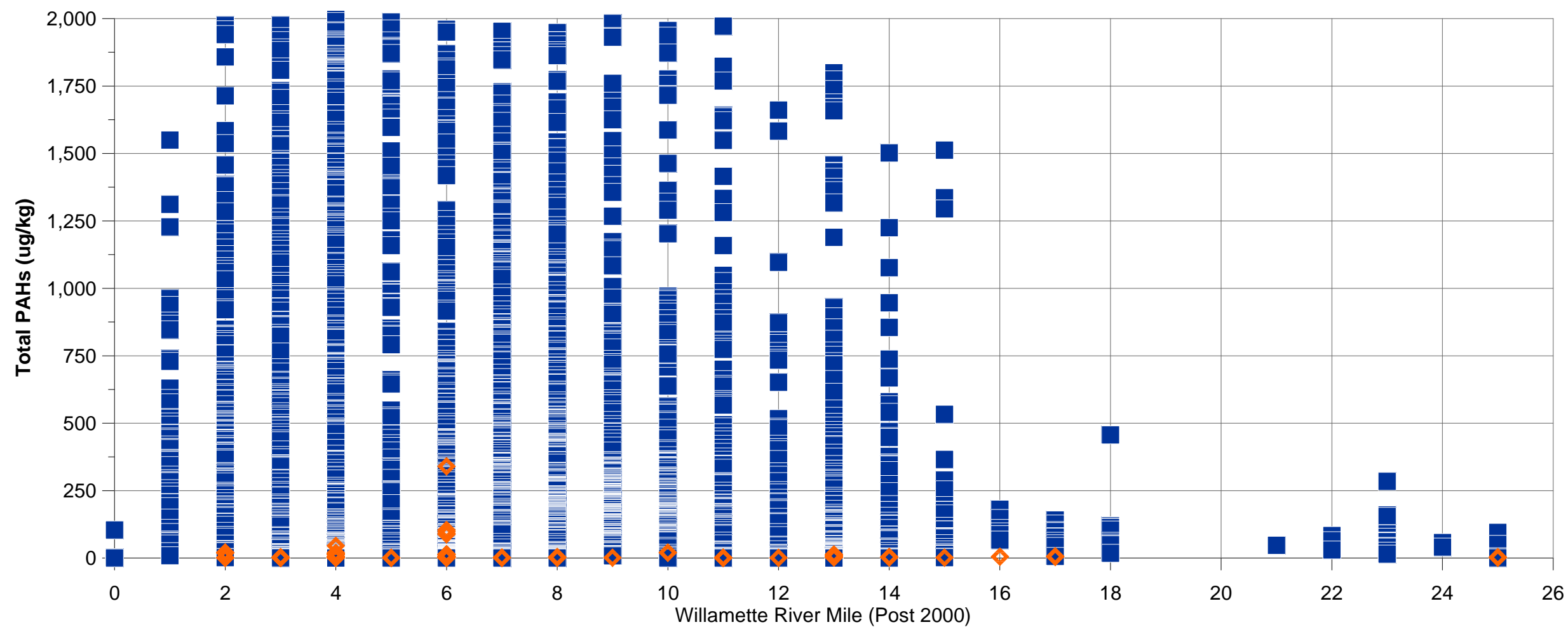
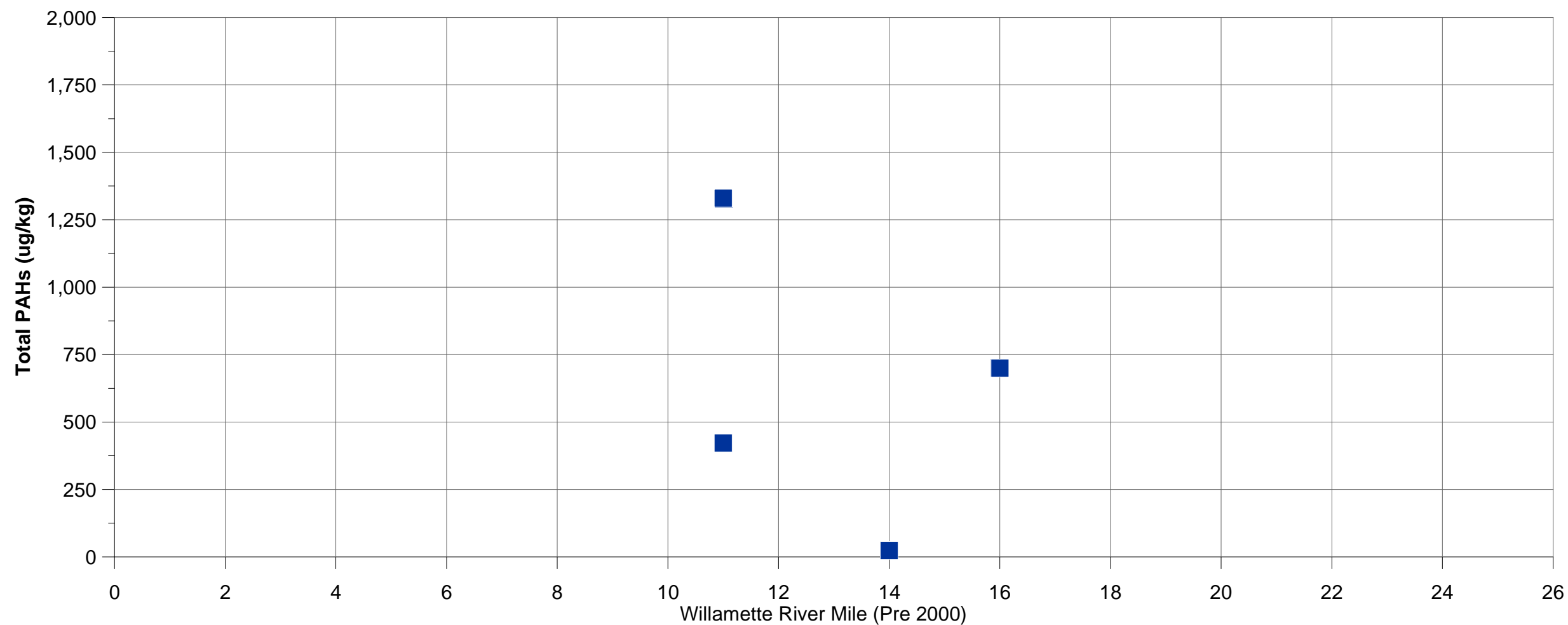


**Note:**  
 River miles are approximate  
 All data in Reach F  
 Date: August 2011



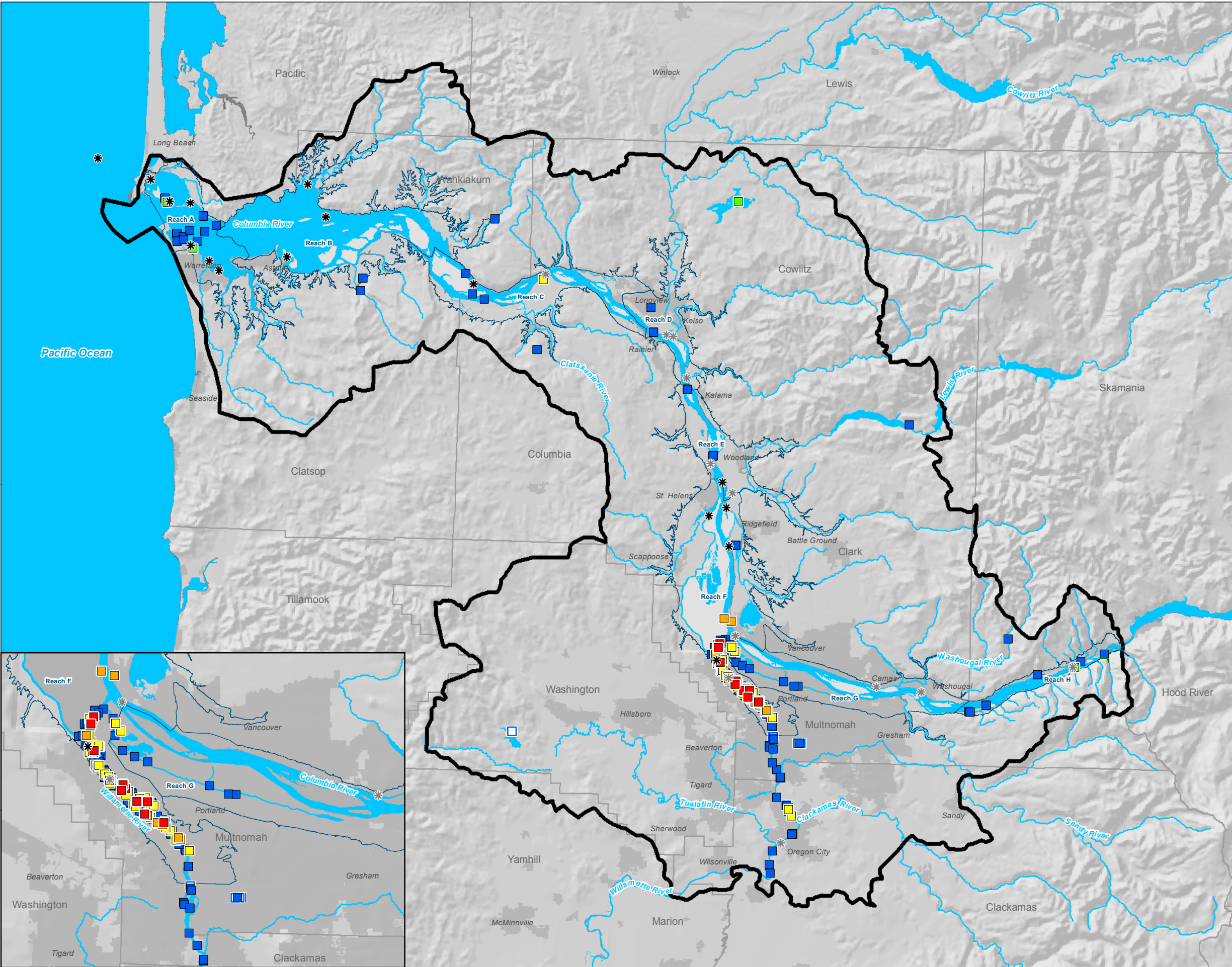


**FIGURE 10b**  
 Total PAHs in Sediment Samples  
 on the Willamette River  
 Lower Columbia River  
 Estuary Partnership



**Note:**  
 River miles are approximate  
 All data in Reach F  
 Date: August 2011





**FIGURE 11**  
**Total PCBs in Biological Samples**  
Lower Columbia River Estuary Partnership

**LEGEND**

**Sample Location**

- Detect
- Non-Detect

**Total Aroclors (ng/kg)**

- 0 - 1,600<sup>1</sup>
- 1.6 - 265,000<sup>2</sup>
- 265 - 880,000<sup>3</sup>
- 880 - 1,700,000<sup>4</sup>
- >1,700,000

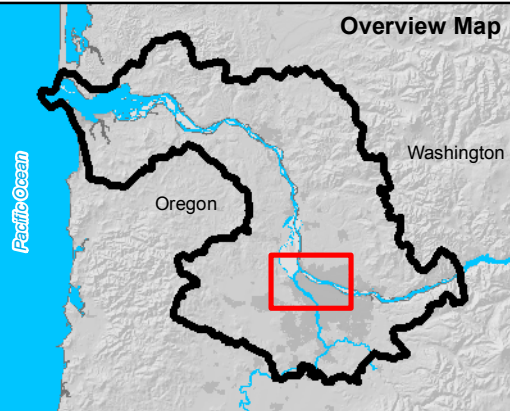
**Proposed Monitoring Sites (1999)**

- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

- ▭ Study Area
- ⬭ River Regions
- ▭ Counties
- ▭ City Limits
- ~ Watercourses
- ~ Waterbodies

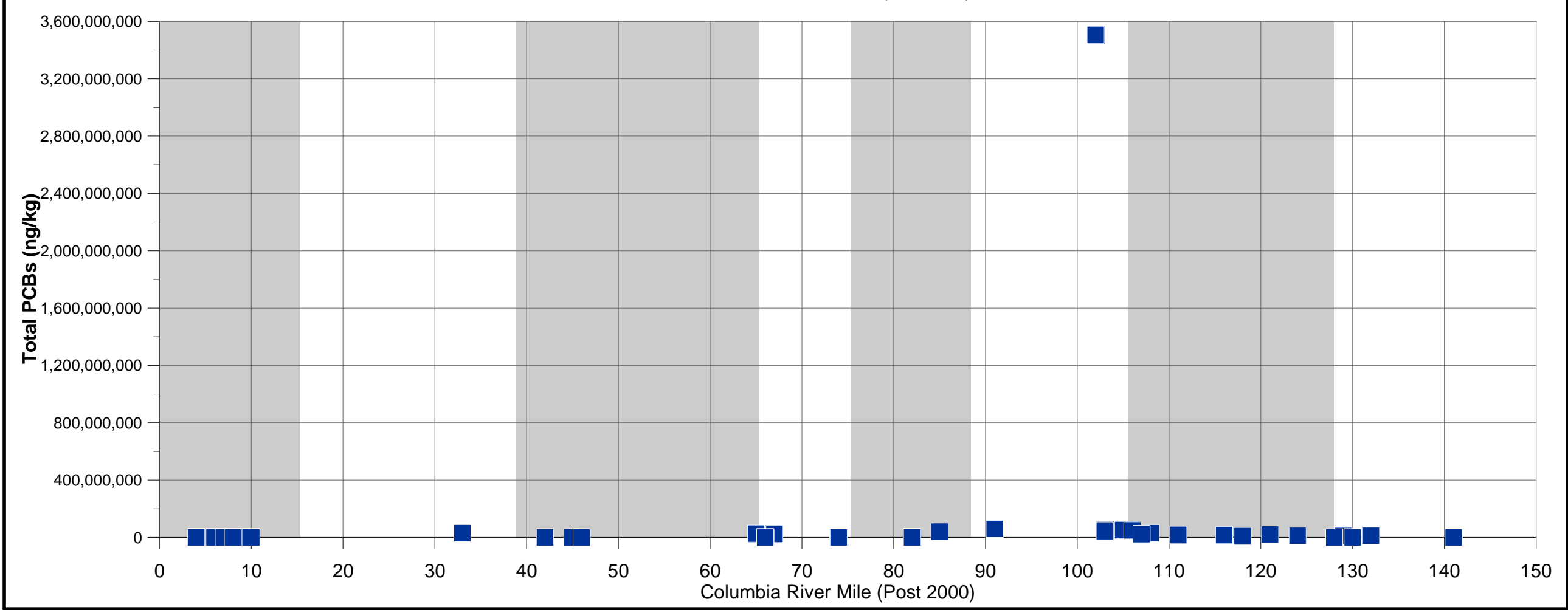
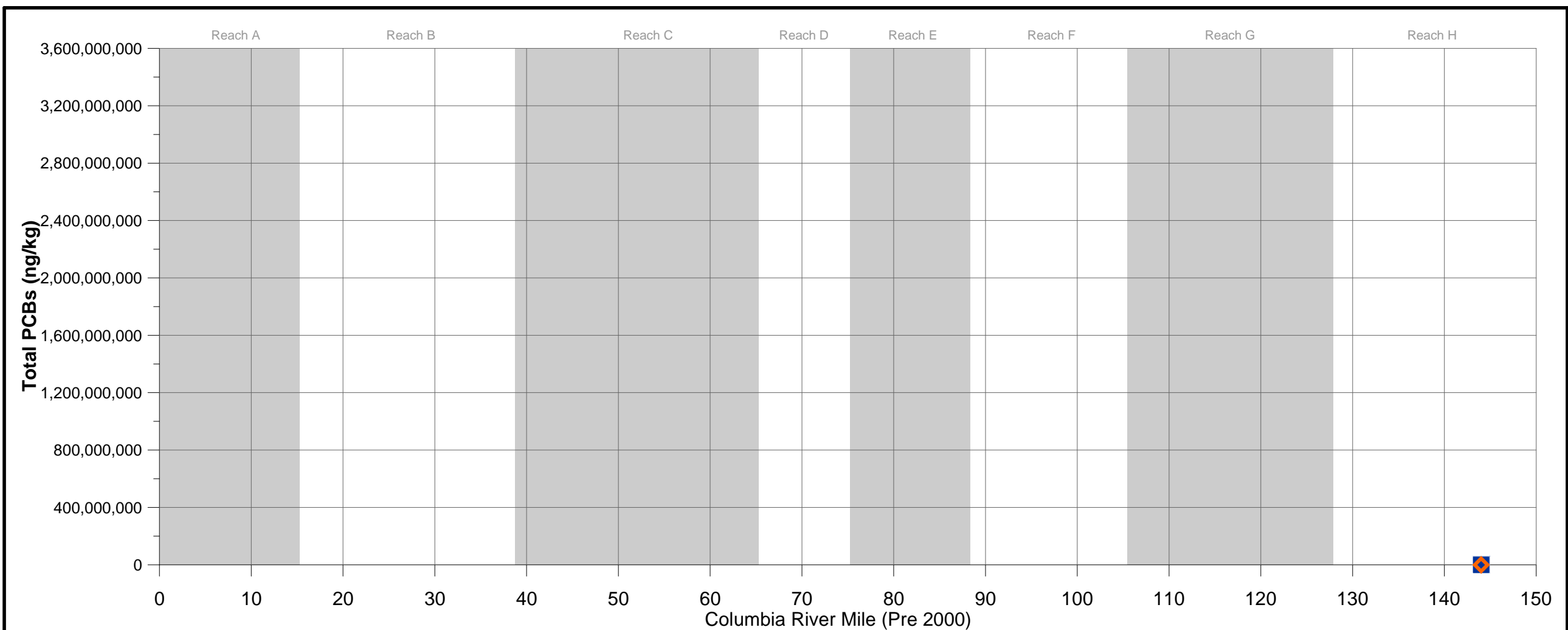
- NOTES**
1. Portland Harbor RI/FS adult tribal fish consumption
  2. Natural break
  3. DEQ Guidance for Assessing Bioaccumulation mammal individual acceptable tissue level
  4. DEQ Guidance for Assessing Bioaccumulation mammal individual acceptable tissue level



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG





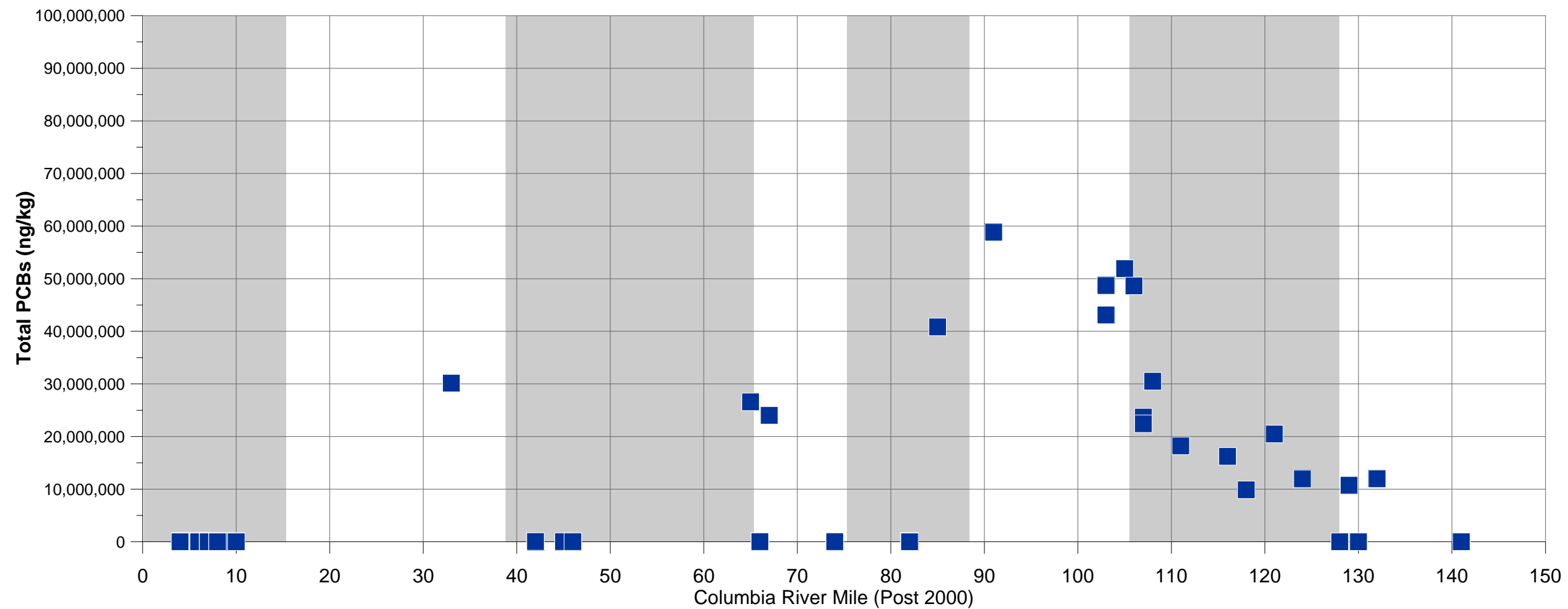
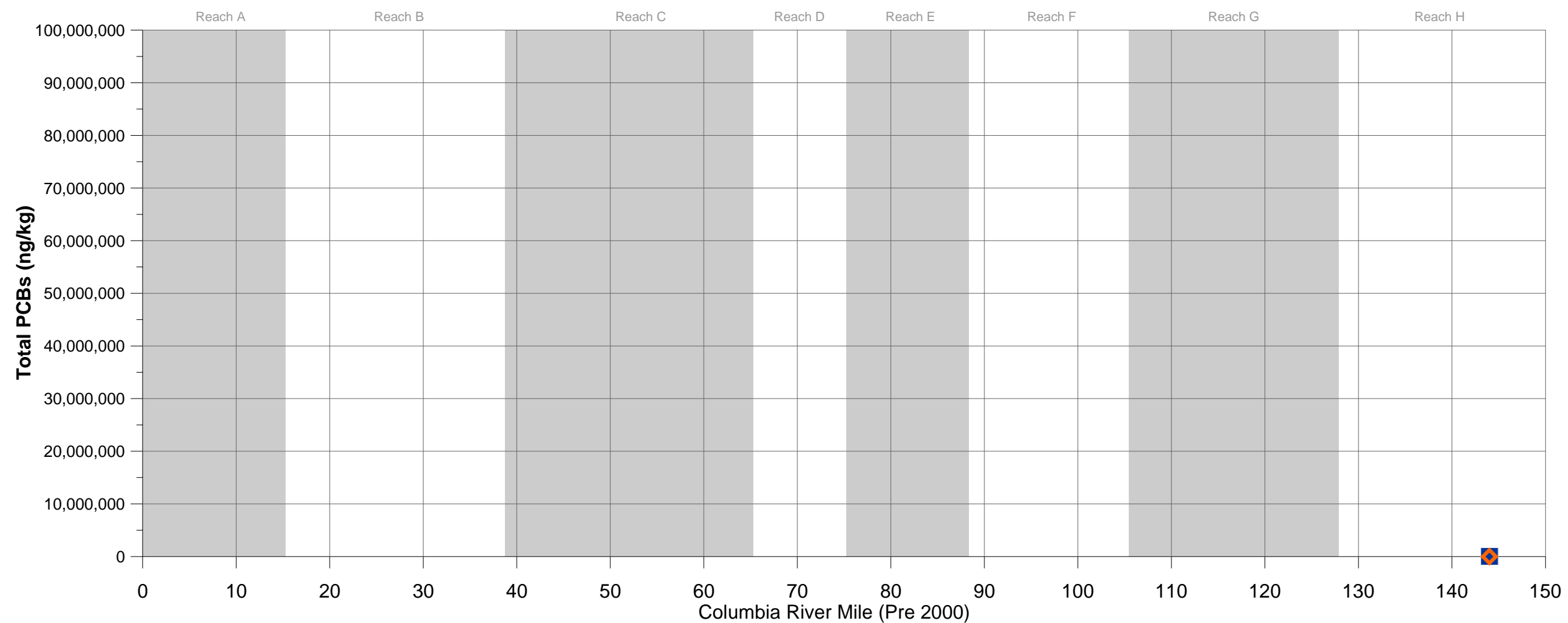


**FIGURE 12a**  
Total PCBs in Biological Samples  
on the Columbia River  
Lower Columbia River  
Estuary Partnership

**Legend**  
■ Detect  
◇ Non-Detect

**Note:**  
River miles and reaches are  
approximate  
Date: August 2011





**FIGURE 12b**  
 Total PCBs in Biological Samples  
 on the Columbia River  
 Lower Columbia River  
 Estuary Partnership

**Legend**  
 ■ Detect  
 ◆ Non-Detect

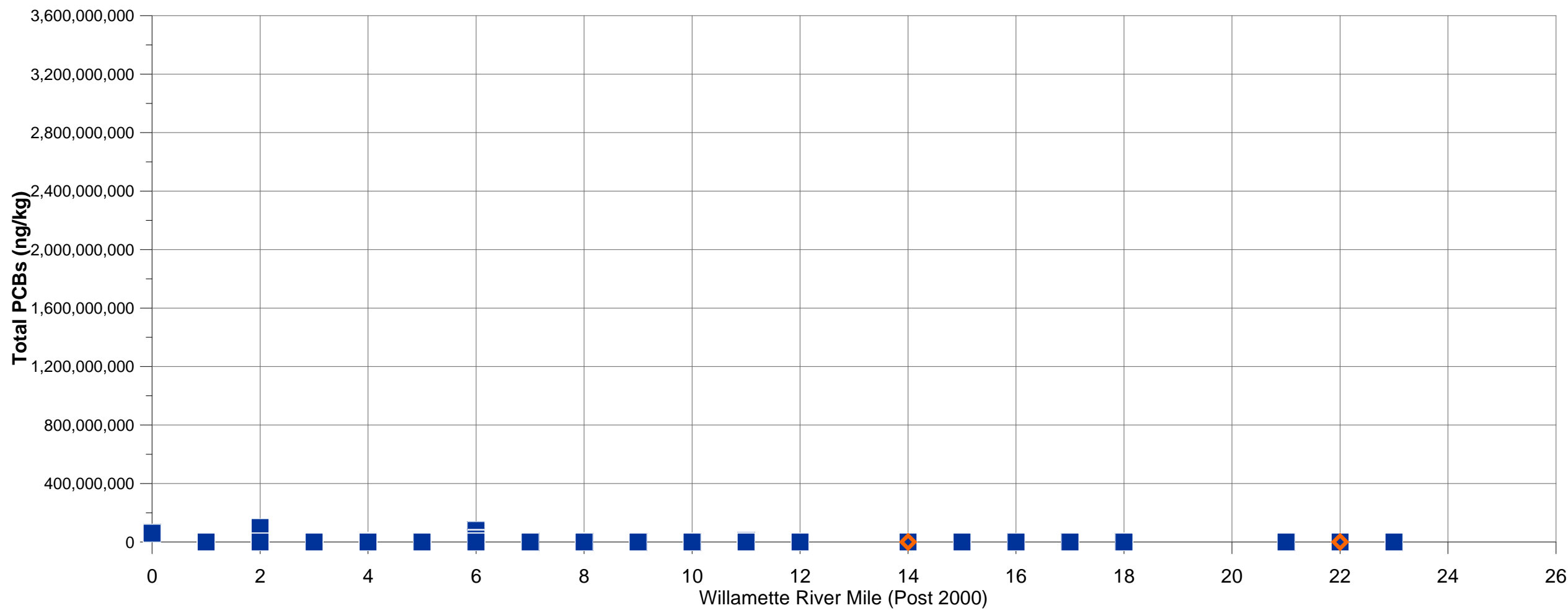
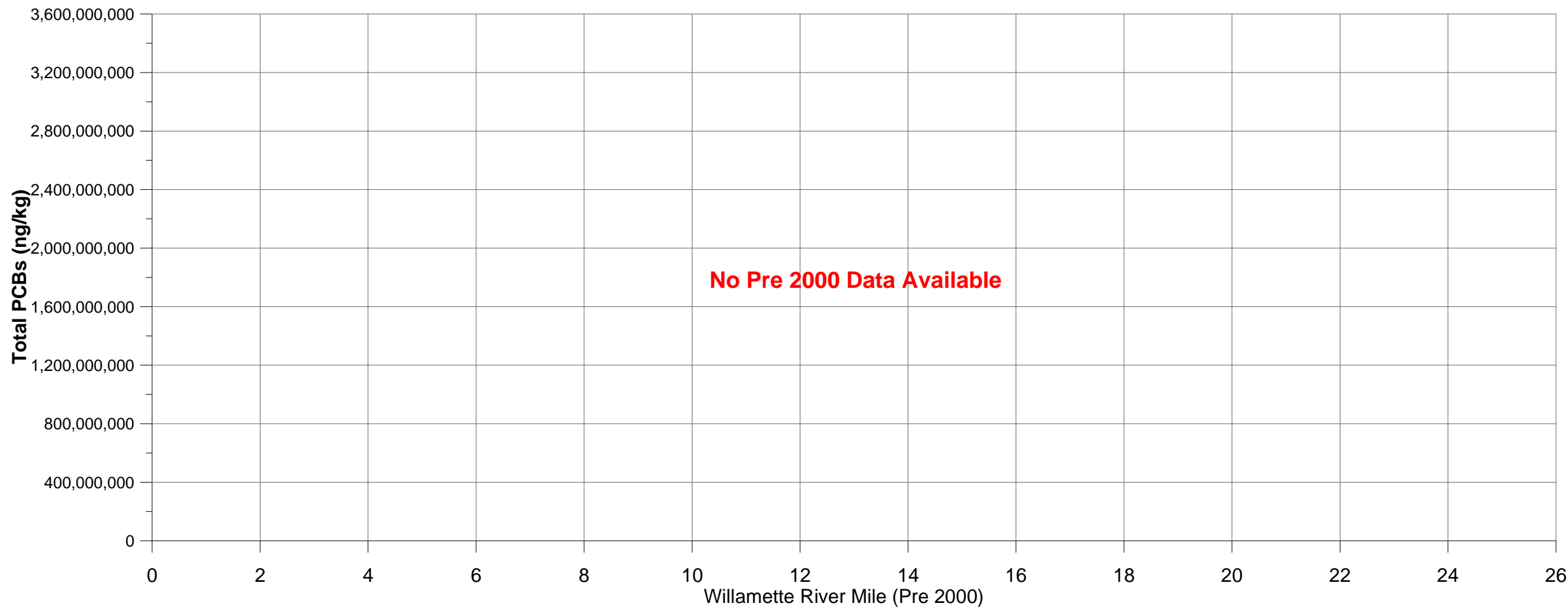
**Note:**  
 River miles and reaches are  
 approximate  
 Date: August 2011





**FIGURE 13a**  
**Total PCBs in Biological Samples**  
**on the Willamette River**  
 Lower Columbia River  
 Estuary Partnership

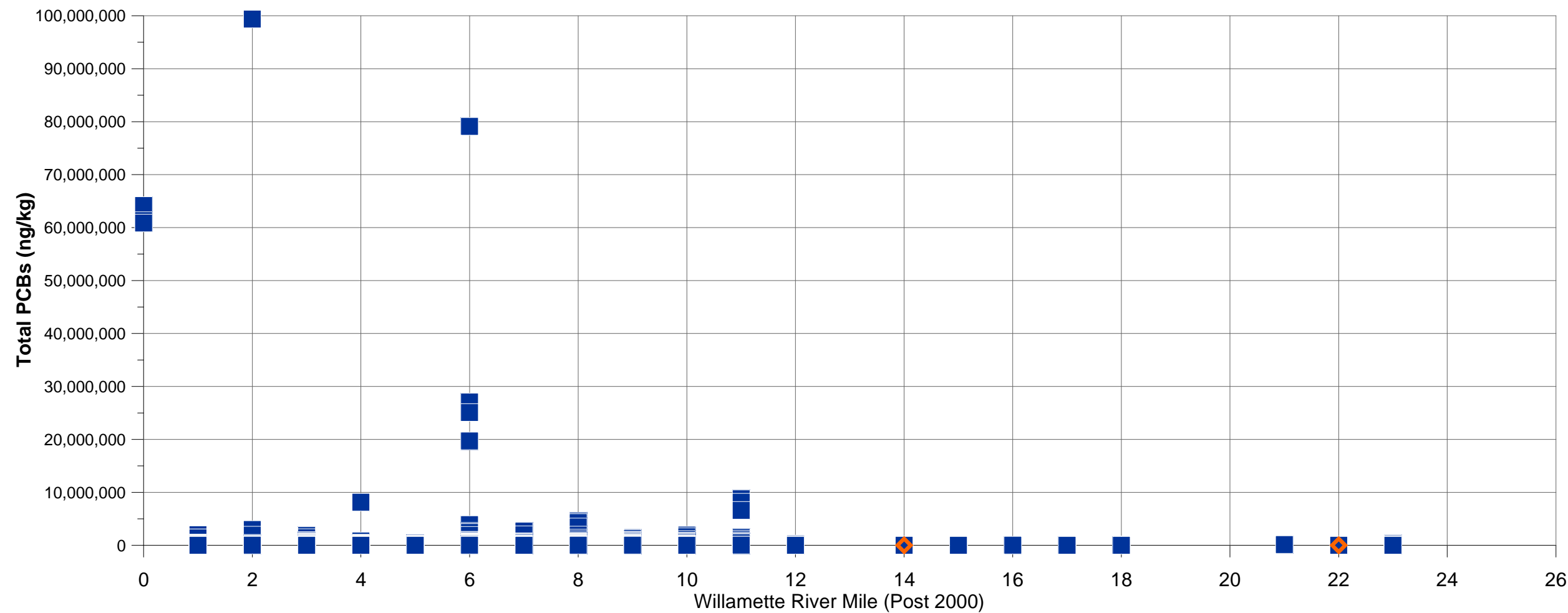
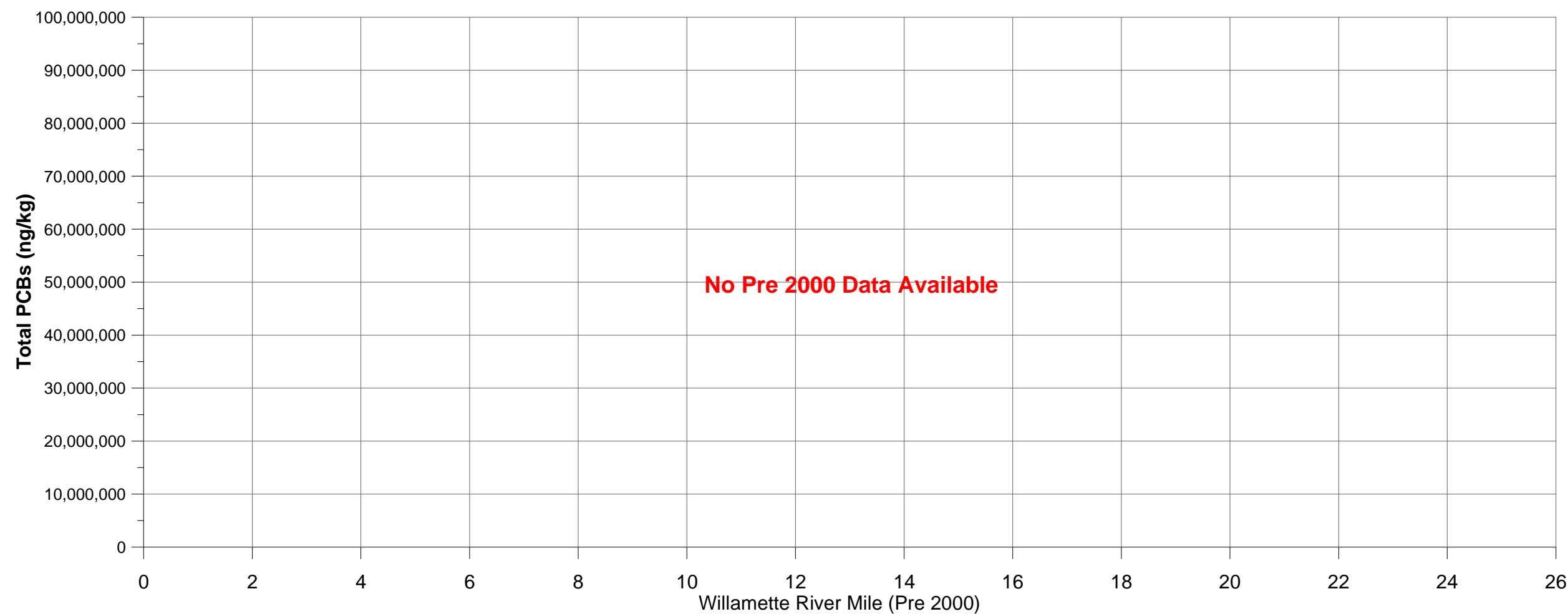
**Legend**  
 Detect  
 Non-Detect



**Note:**  
 River miles are approximate  
 All data in Reach F  
 Date: August 2011



**FIGURE 13b**  
 Total PCBs in Biological Samples  
 on the Willamette River  
 Lower Columbia River  
 Estuary Partnership

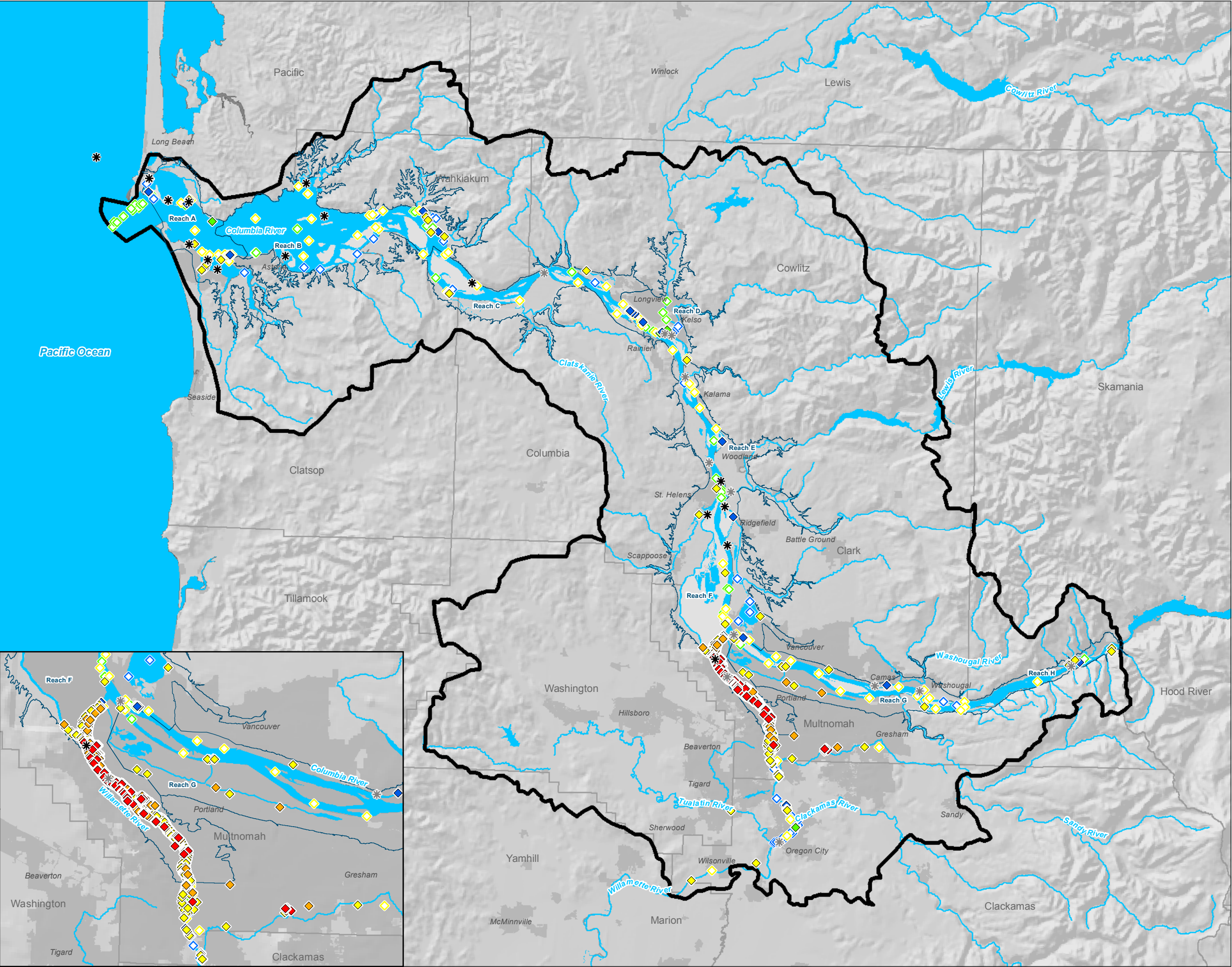


**Legend**  
 ■ Detect  
 ◇ Non-Detect

**Note:**  
 River miles are approximate  
 All data in Reach F  
 Date: August 2011



**FIGURE 14**  
**Total DDx in Sediment Samples**  
Lower Columbia River Estuary Partnership



**LEGEND**

**Sample Location**

- ◆ Detect
- ◇ Non-Detect

**Total DDx (ug/kg)**

- ◆ 0 - 0.39<sup>1</sup>
- ◆ 0.39 - 1.58<sup>2</sup>
- ◆ 1.58 - 46.1<sup>3</sup>
- ◆ 46.1 - 218<sup>4</sup>
- ◆ > 218

**Proposed Monitoring Sites (1999)**

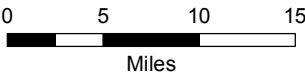
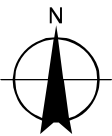
- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

- ▭ Study Area
- ⋈ River Regions
- ▭ Counties
- ▭ City Limits
- ~ Watercourses
- ~ Waterbodies

**NOTES**

1. DEQ Bioaccumulation for fish
2. DOE Sediment Guideline ERL Total DDT
3. DOE Sediment Guideline ERL Total DDT
4. PH Focused PRG Ecobenthic FPM High SQG

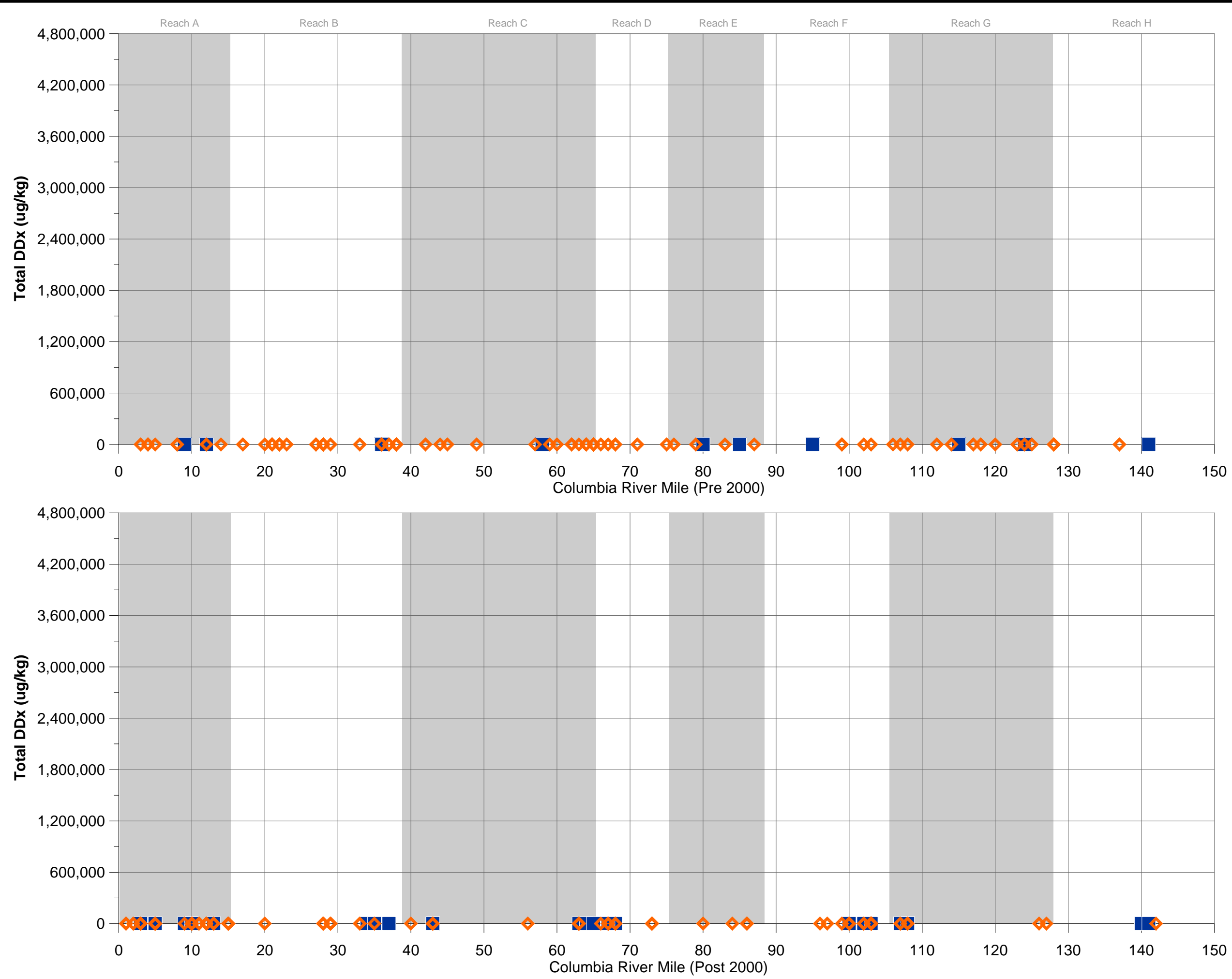


**MAP NOTES:**

Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG





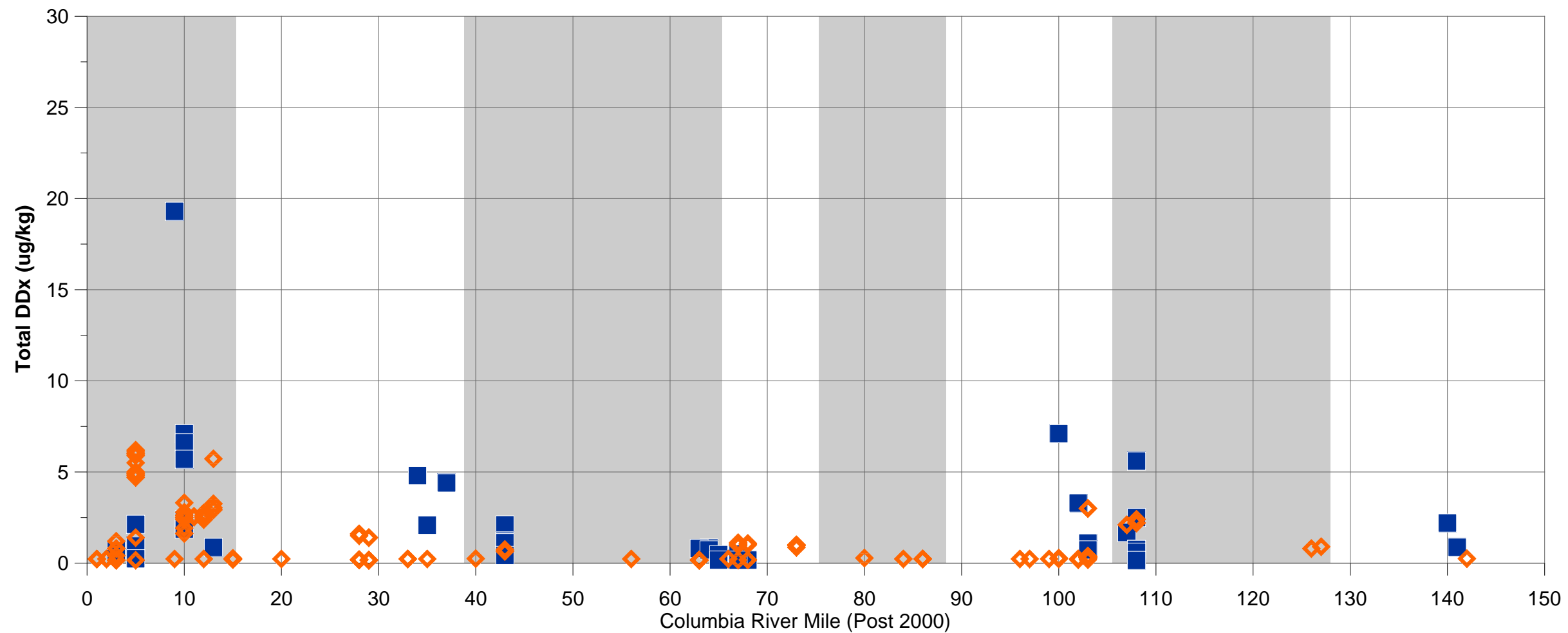
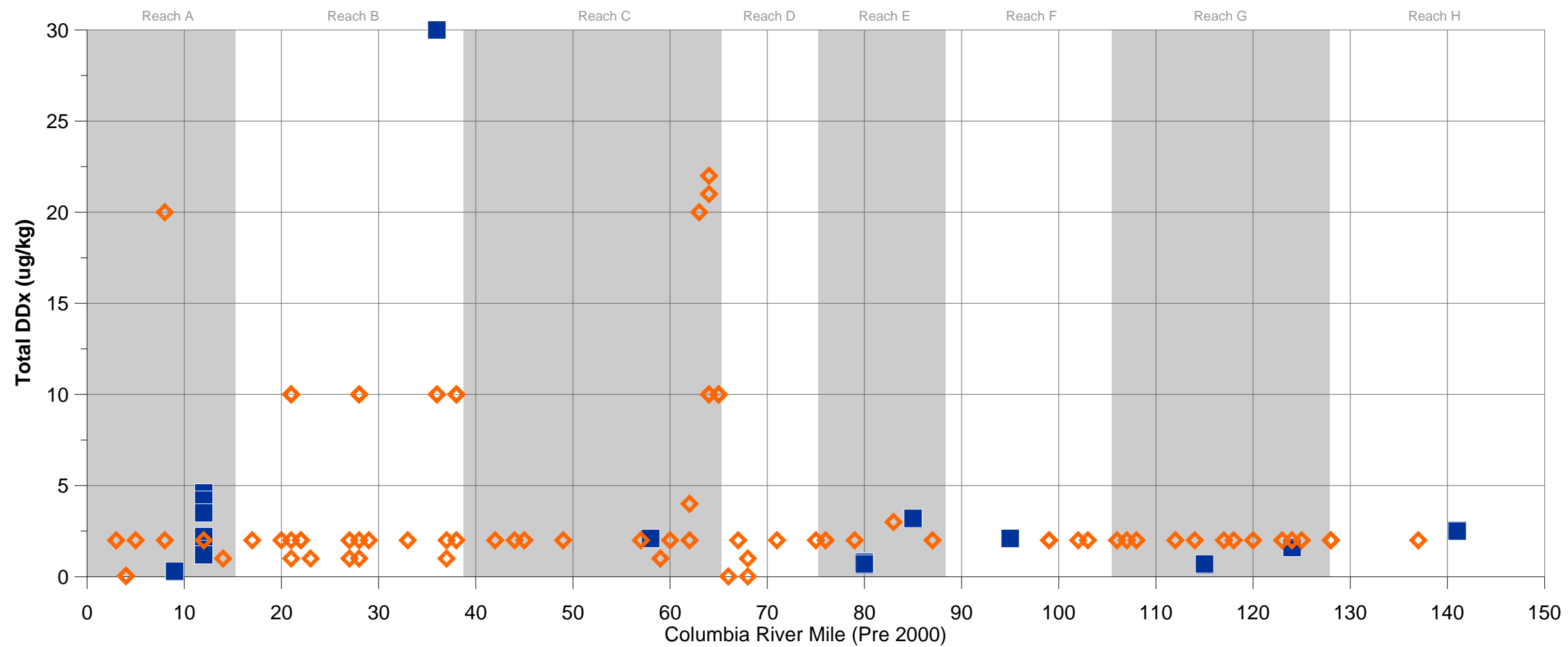


**FIGURE 15a**  
Total DDX in Sediment Samples  
on the Columbia River  
Lower Columbia River  
Estuary Partnership

**Legend**  
Detect  
Non-Detect

**Note:**  
River miles and reaches are  
approximate  
Date: August 2011





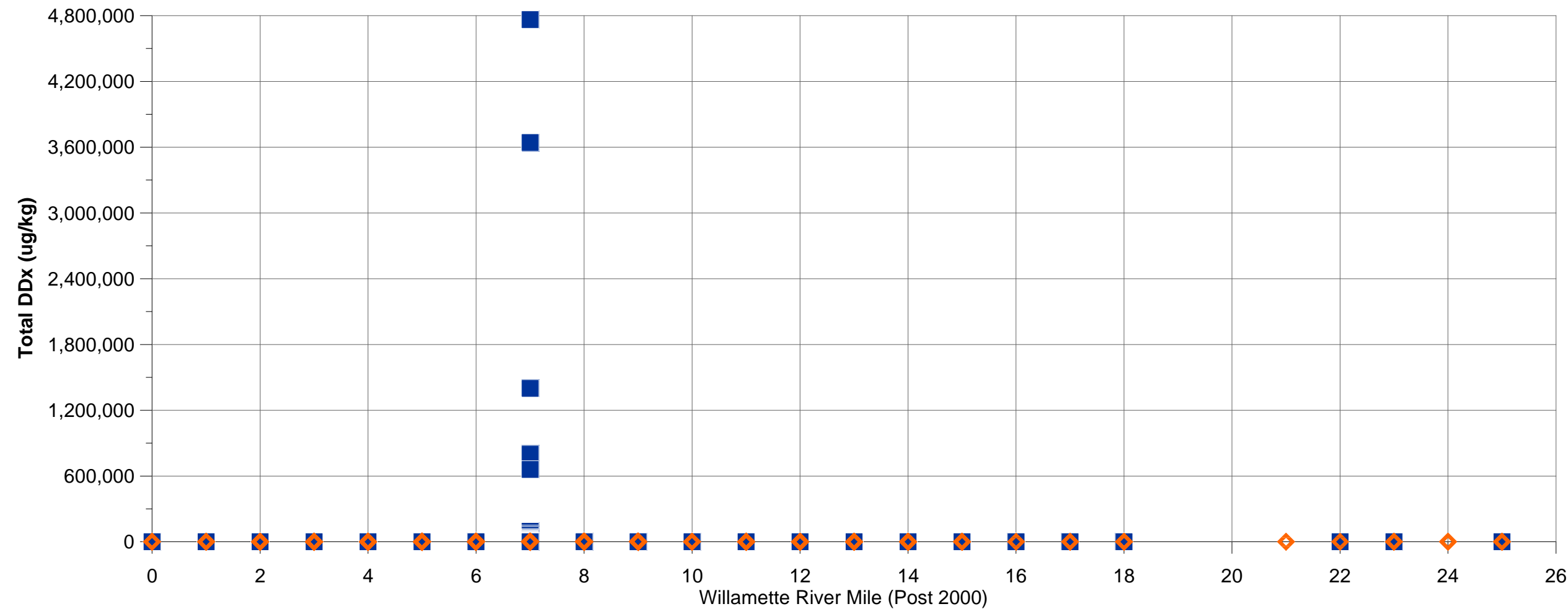
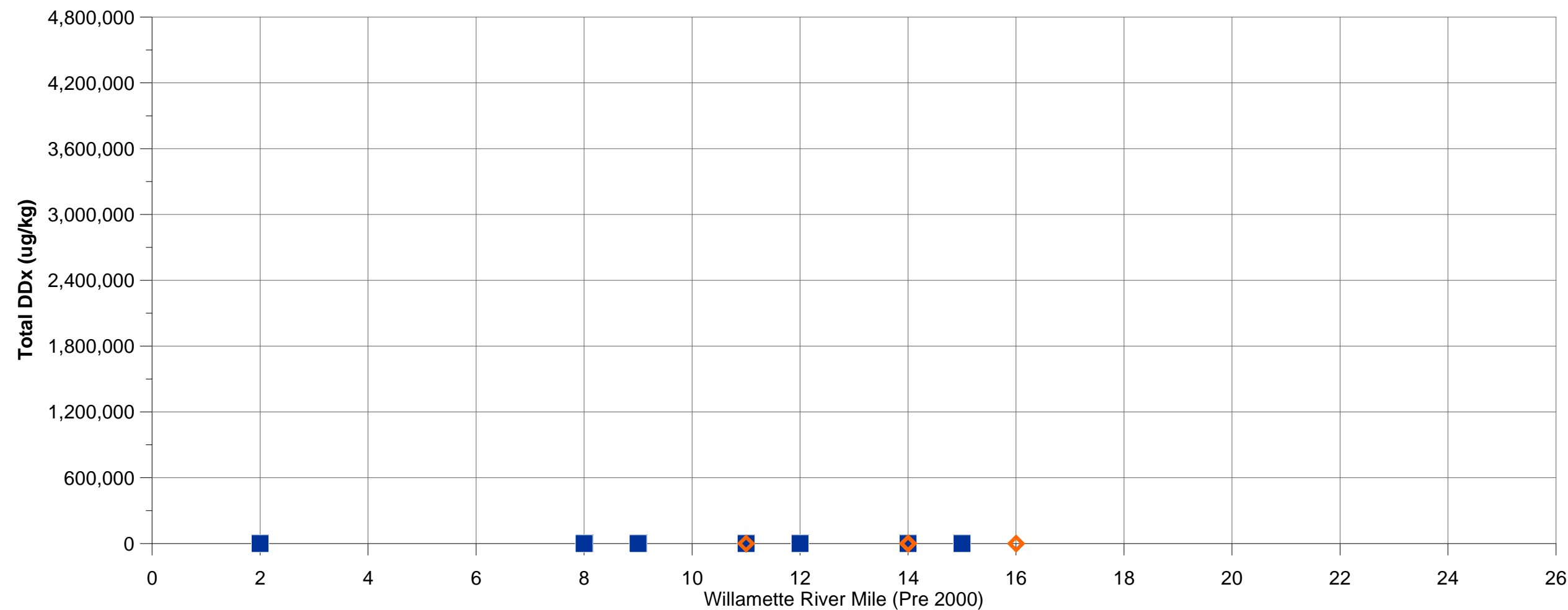
**FIGURE 15b**  
Total DDX in Sediment Samples  
on the Columbia River  
Lower Columbia River  
Estuary Partnership

**Legend**  
■ Detect  
◇ Non-Detect

**Note:**  
River miles and reaches are  
approximate  
Date: August 2011



**FIGURE 16a**  
Total DDx in Sediment Samples  
on the Willamette River  
Lower Columbia River  
Estuary Partnership





**Note:**  
River miles are approximate  
All data in Reach F  
Date: August 2011

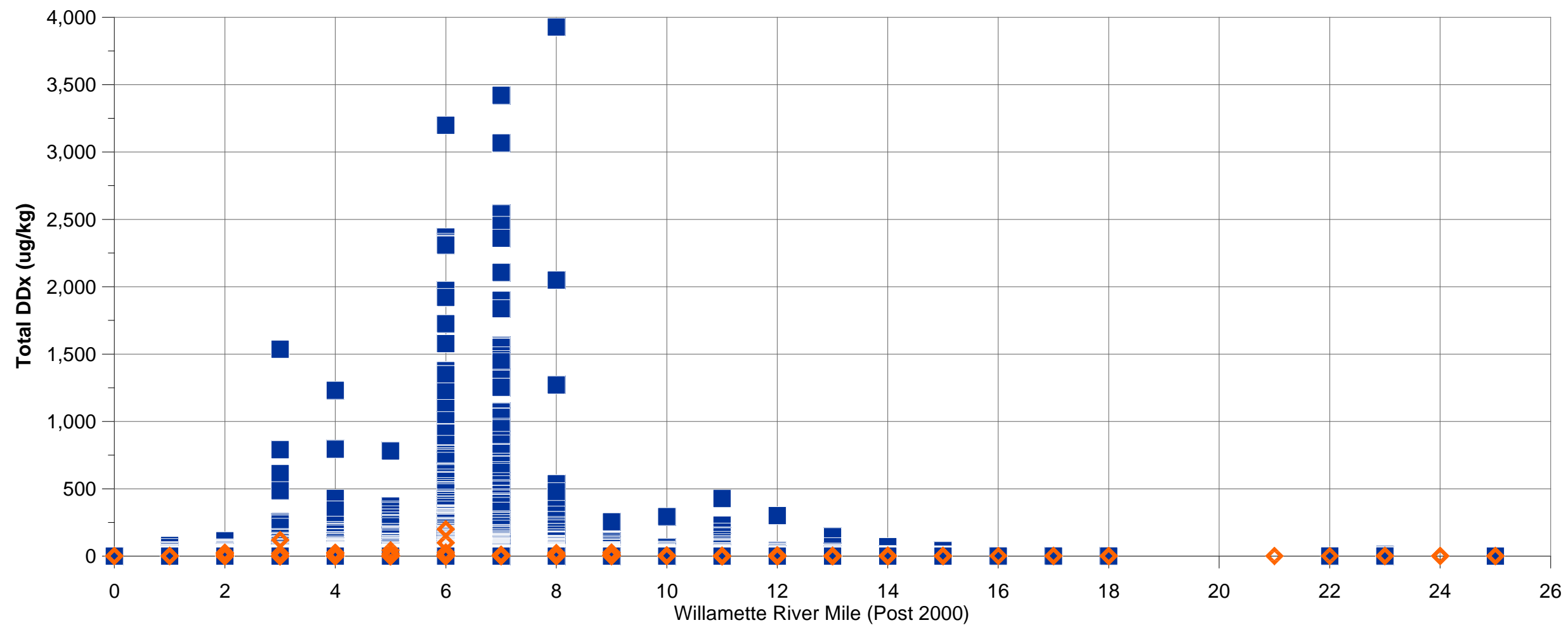


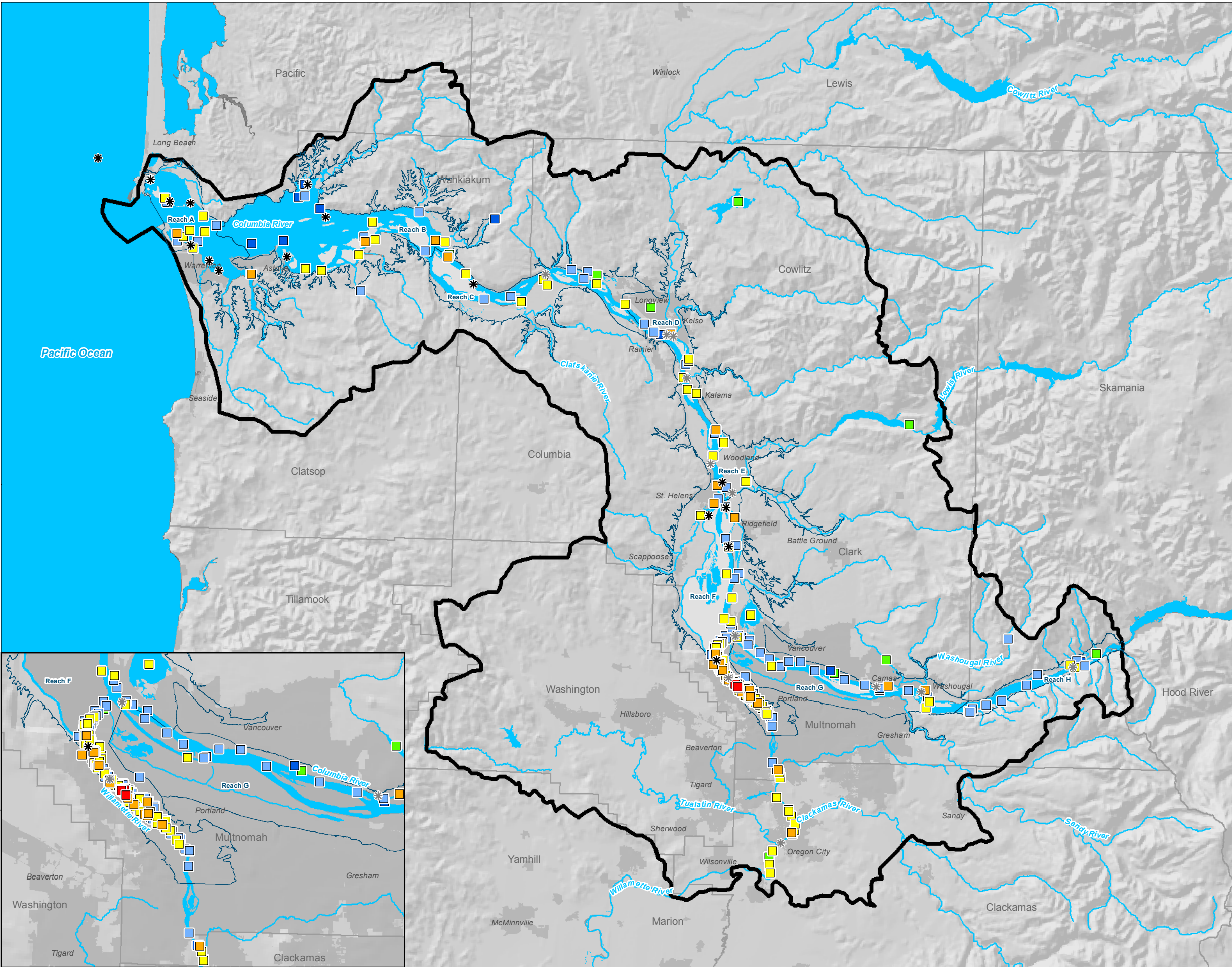


**Legend**

 Detect

 Non-Detect





**FIGURE 17**  
**Total DDx in Biological Samples**  
Lower Columbia River Estuary Partnership

**LEGEND**

**Sample Location, Grab**

- Detect
- Non-Detect

**Total DDx (ug/kg)**

- 0 - 3.4<sup>1</sup>
- 3.4 - 13<sup>2</sup>
- 13 - 50
- 50 - 200
- 200 - 760
- >760

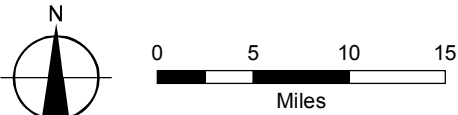
**Proposed Monitoring Sites (1999)**

- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

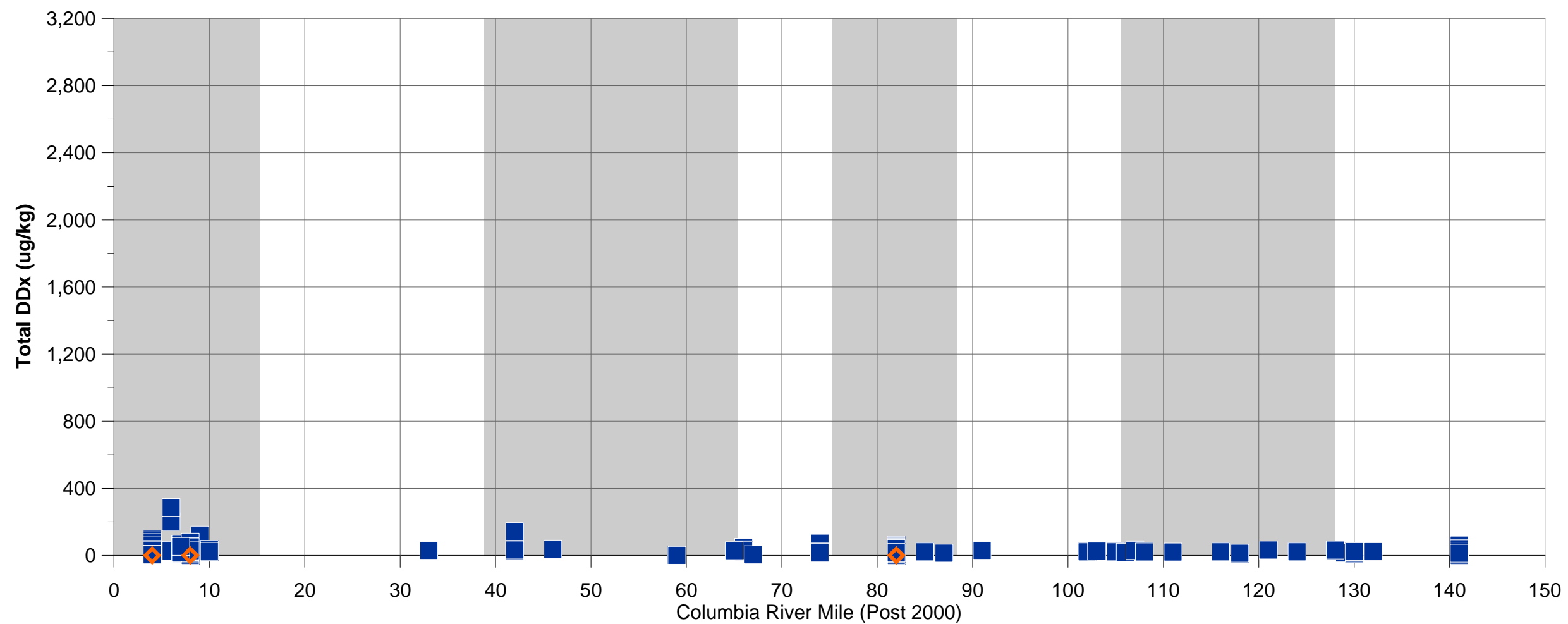
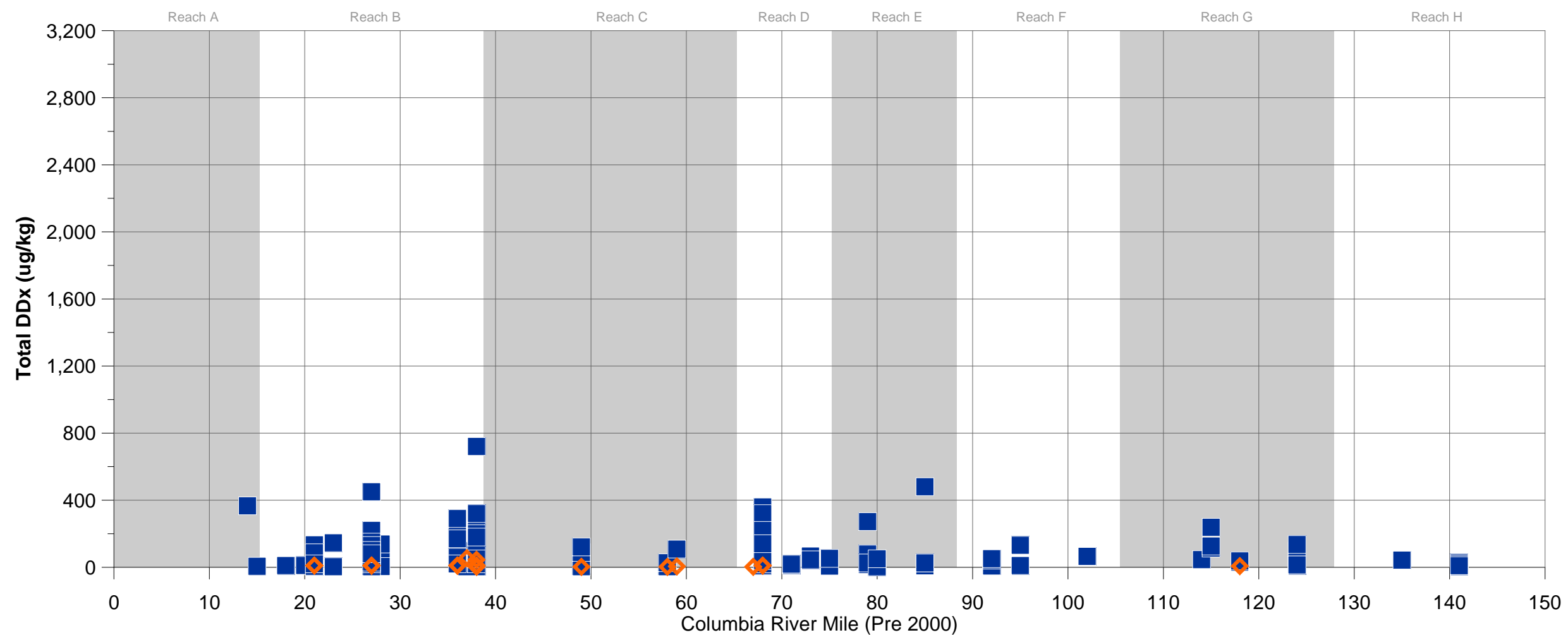
- ▭ Study Area
- ⦶ River Regions
- ▭ Counties
- ▭ City Limits
- ~ Watercourses
- ~ Waterbodies

**NOTES**  
1. DEQ Bioaccumulation Triabl consuption acceptable tissue concentration  
2. DEQ Bioaccumulation Bird Egg acceptable tisse



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG



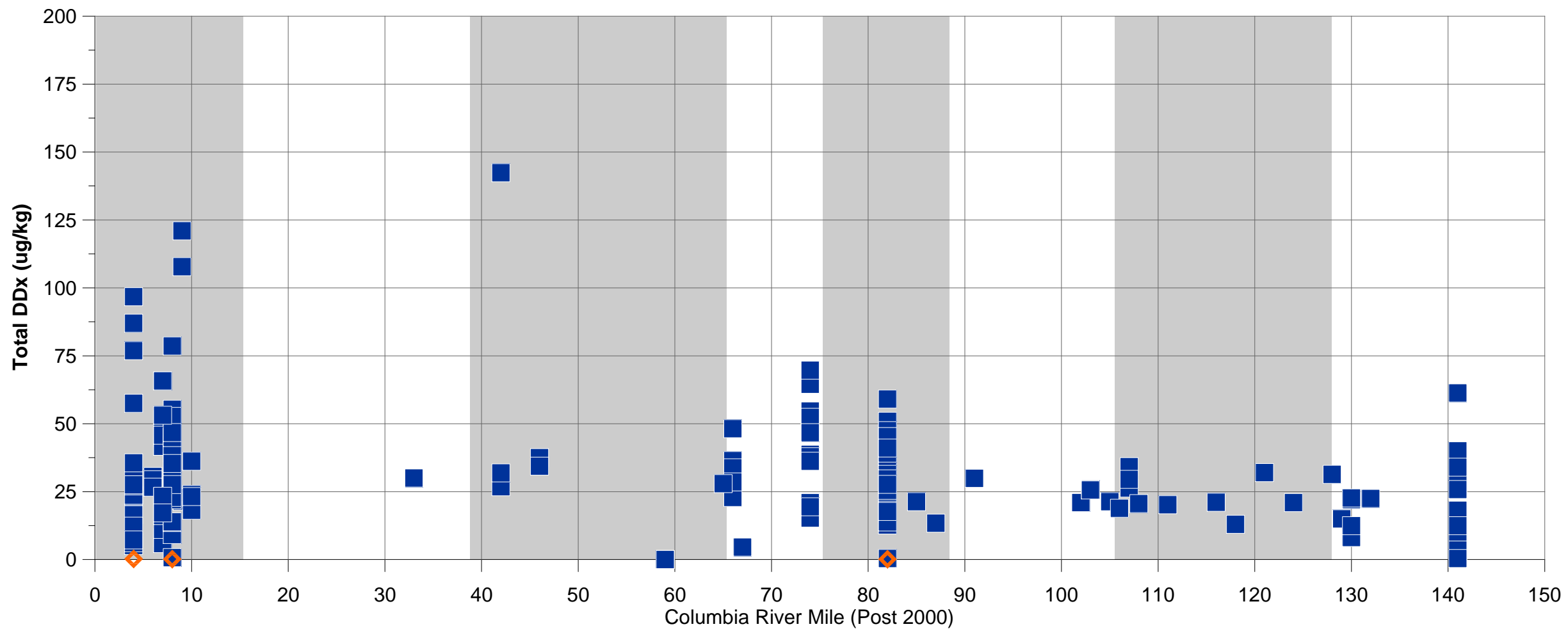
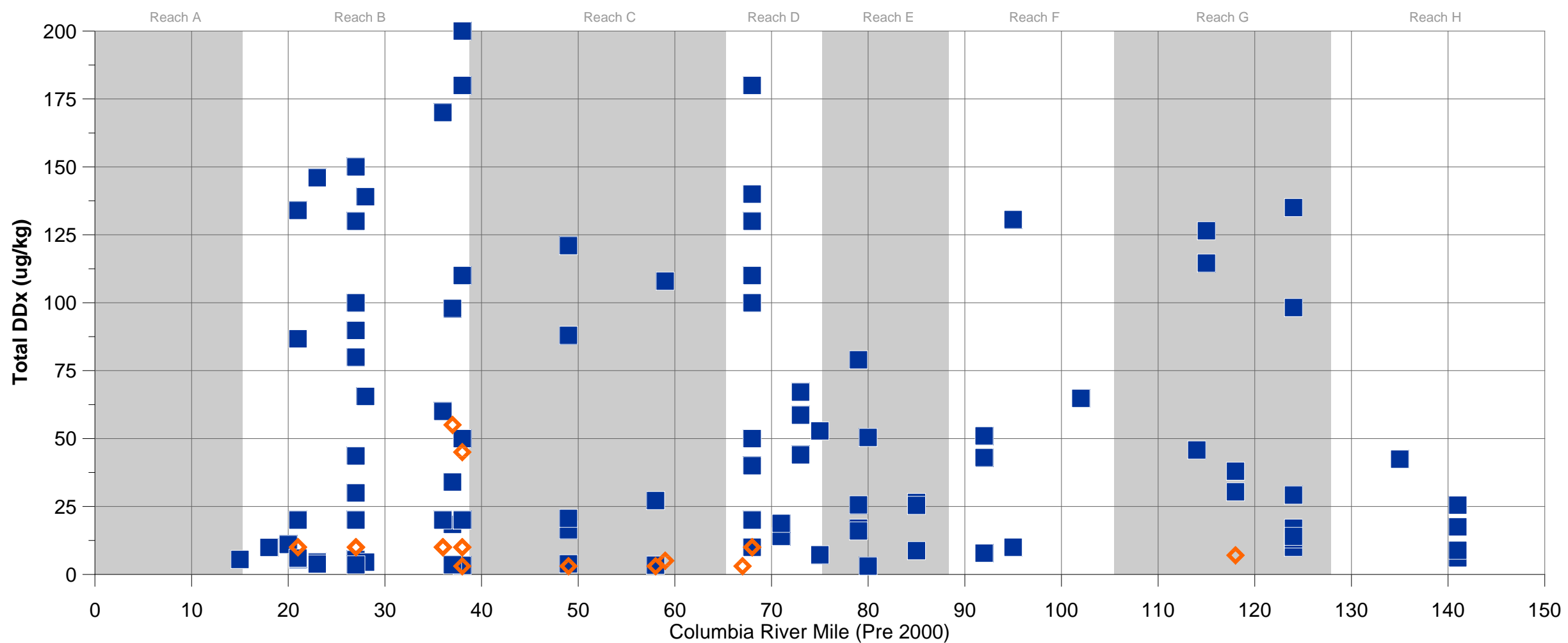


**FIGURE 18a**  
 Total DDX in Biological Samples  
 on the Columbia River  
 Lower Columbia River  
 Estuary Partnership

**Note:**  
 River miles and reaches are  
 approximate  
 Date: August 2011







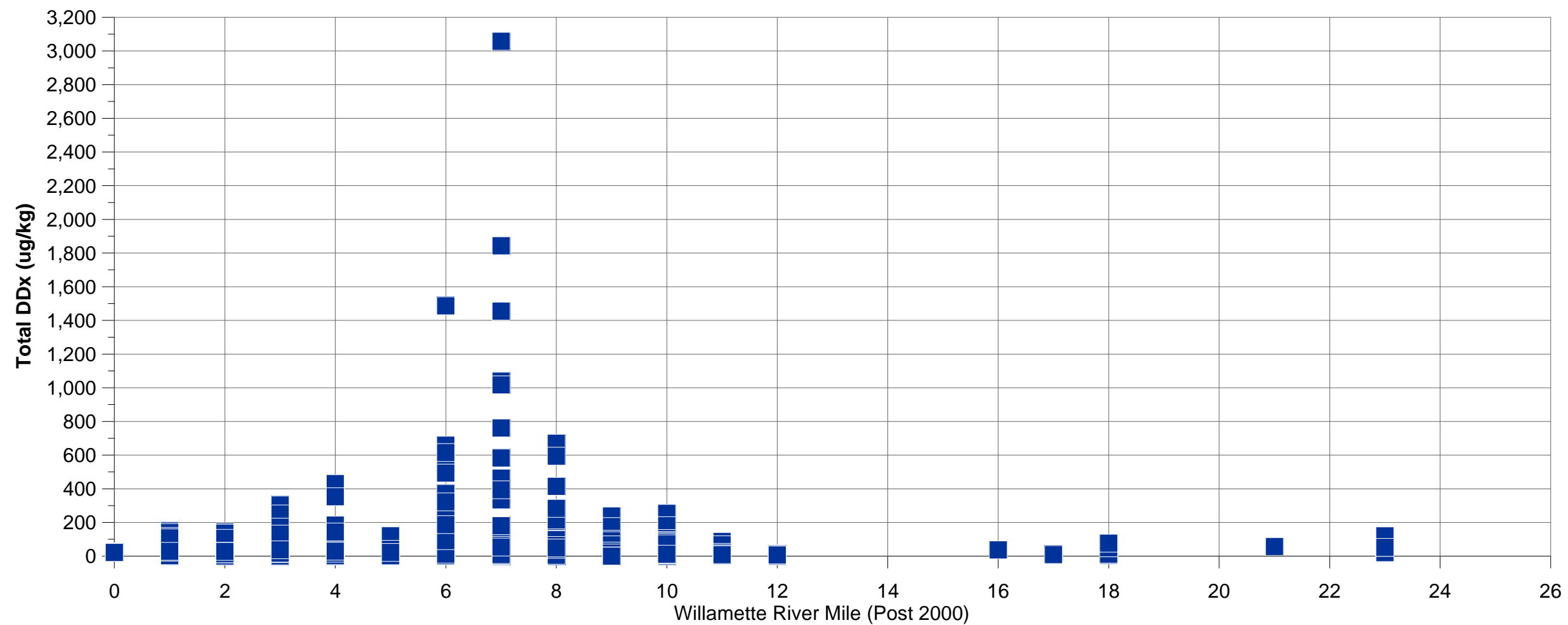
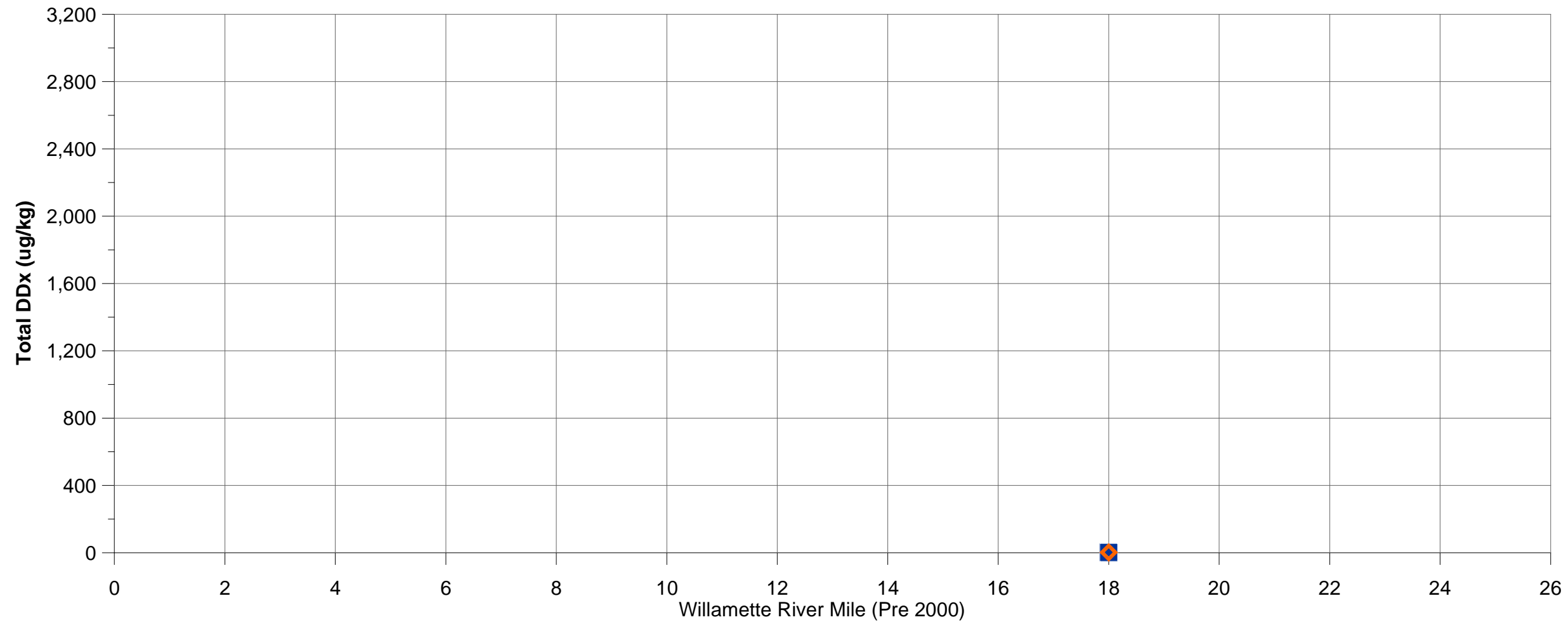
**FIGURE 18b**  
Total DDx in Biological Samples  
on the Columbia River  
Lower Columbia River  
Estuary Partnership

**Legend**  
■ Detect  
◆ Non-Detect

**Note:**  
River miles and reaches are  
approximate  
Date: August 2011

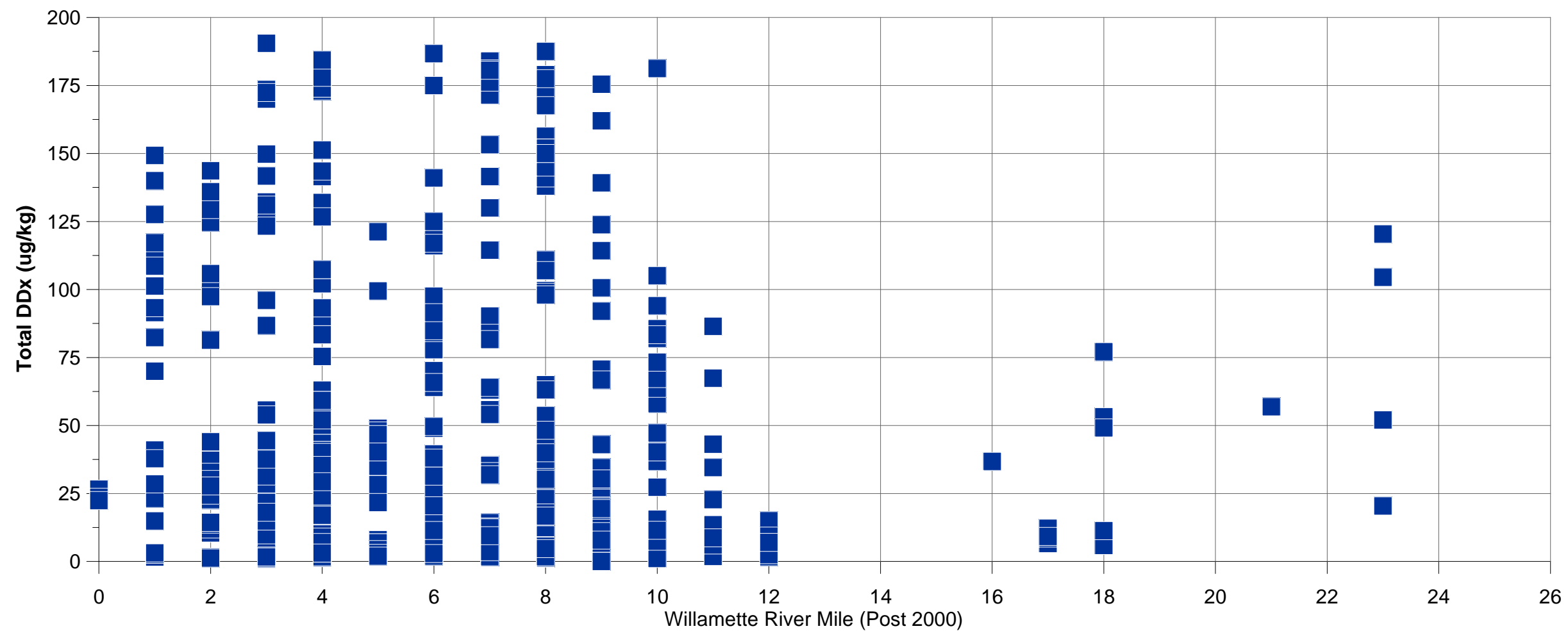
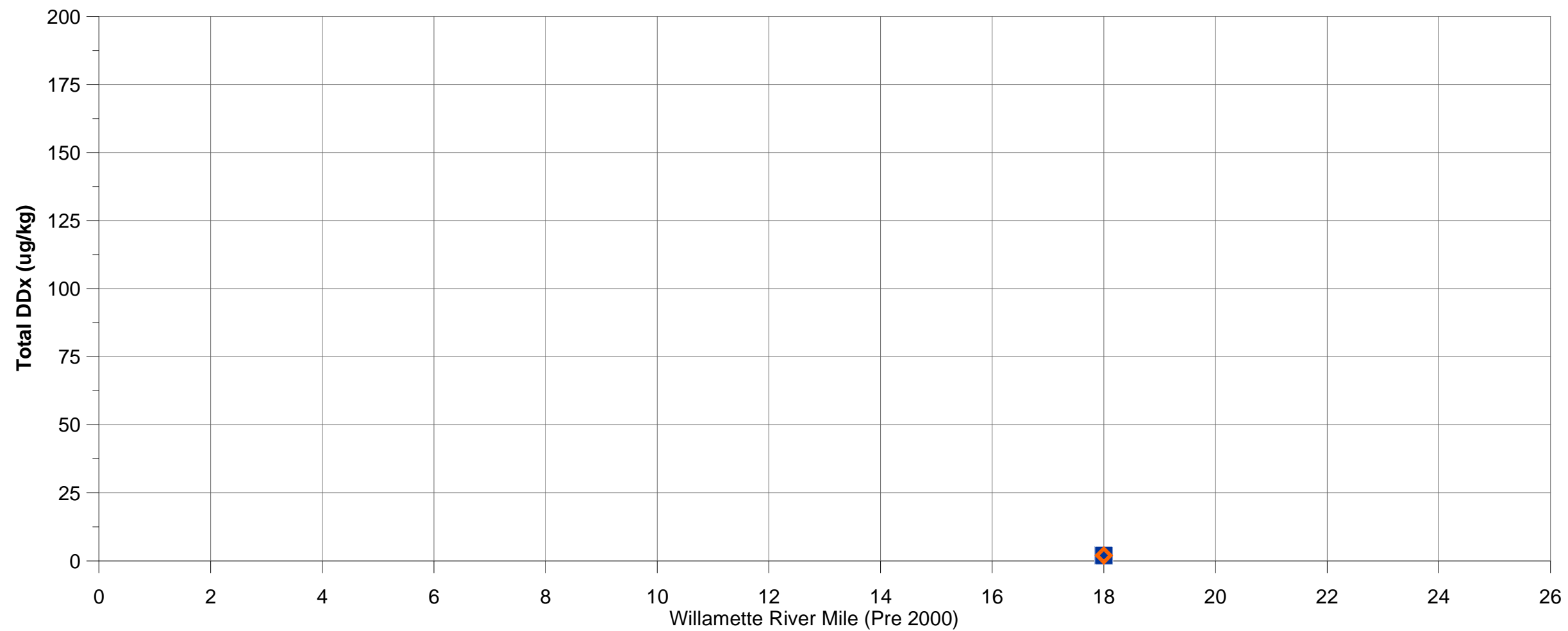


**FIGURE 19a**  
 Total DDx in Biological Samples  
 on the Willamette River  
 Lower Columbia River  
 Estuary Partnership



**Note:**  
 River miles are approximate  
 All data in Reach F  
 Date: August 2011

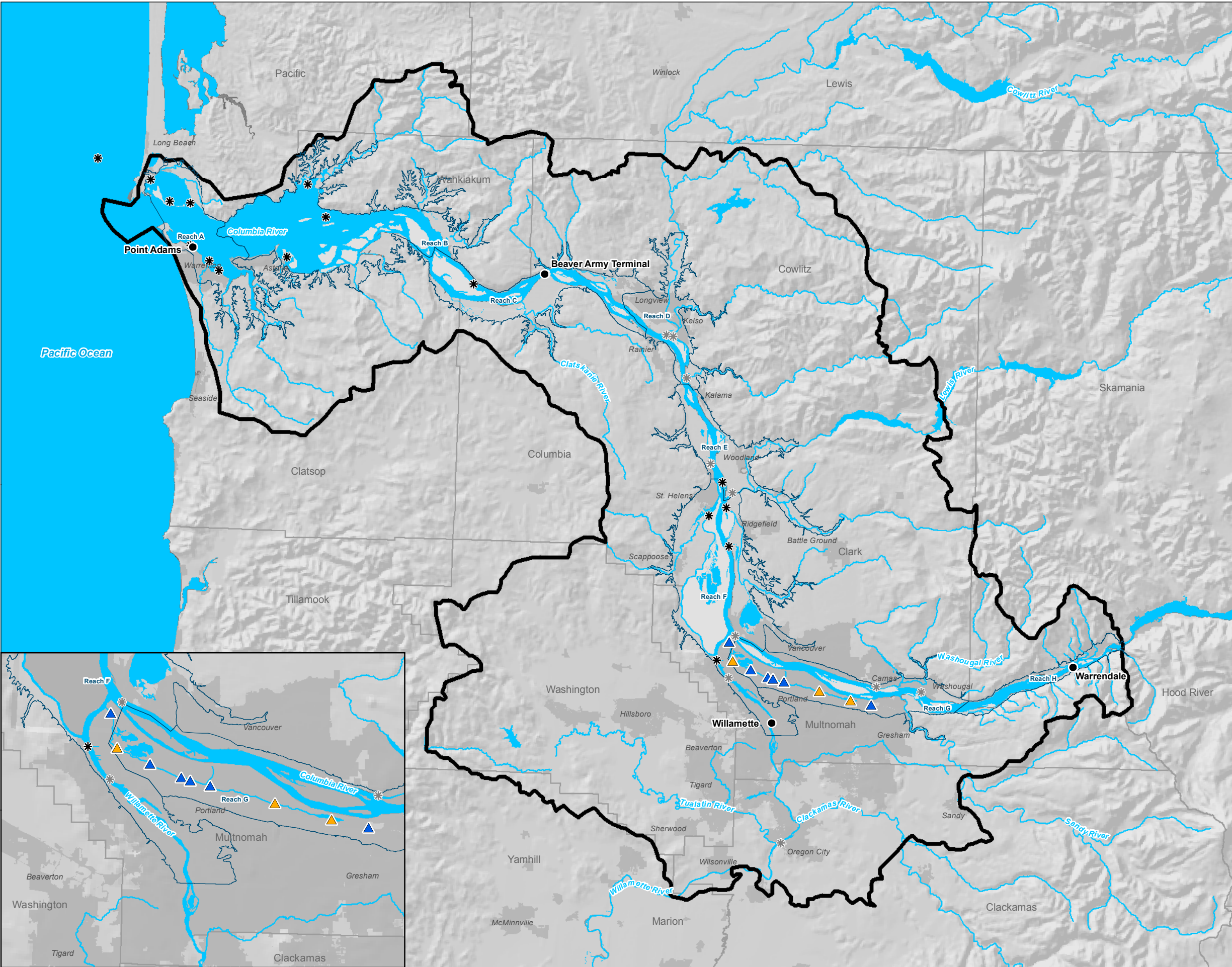
**FIGURE 19b**  
 Total DDx in Biological Samples  
 on the Willamette River  
 Lower Columbia River  
 Estuary Partnership



**Note:**  
 River miles are approximate  
 All data in Reach F  
 Date: August 2011





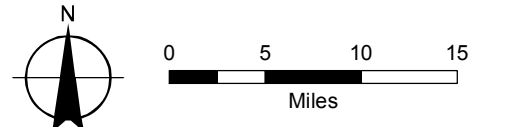
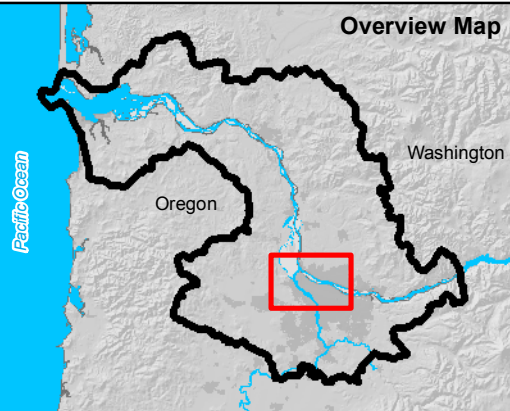


**FIGURE 20**  
**Total DDX in SPMDs, March - April 2005**  
Lower Columbia River Estuary Partnership

**LEGEND**

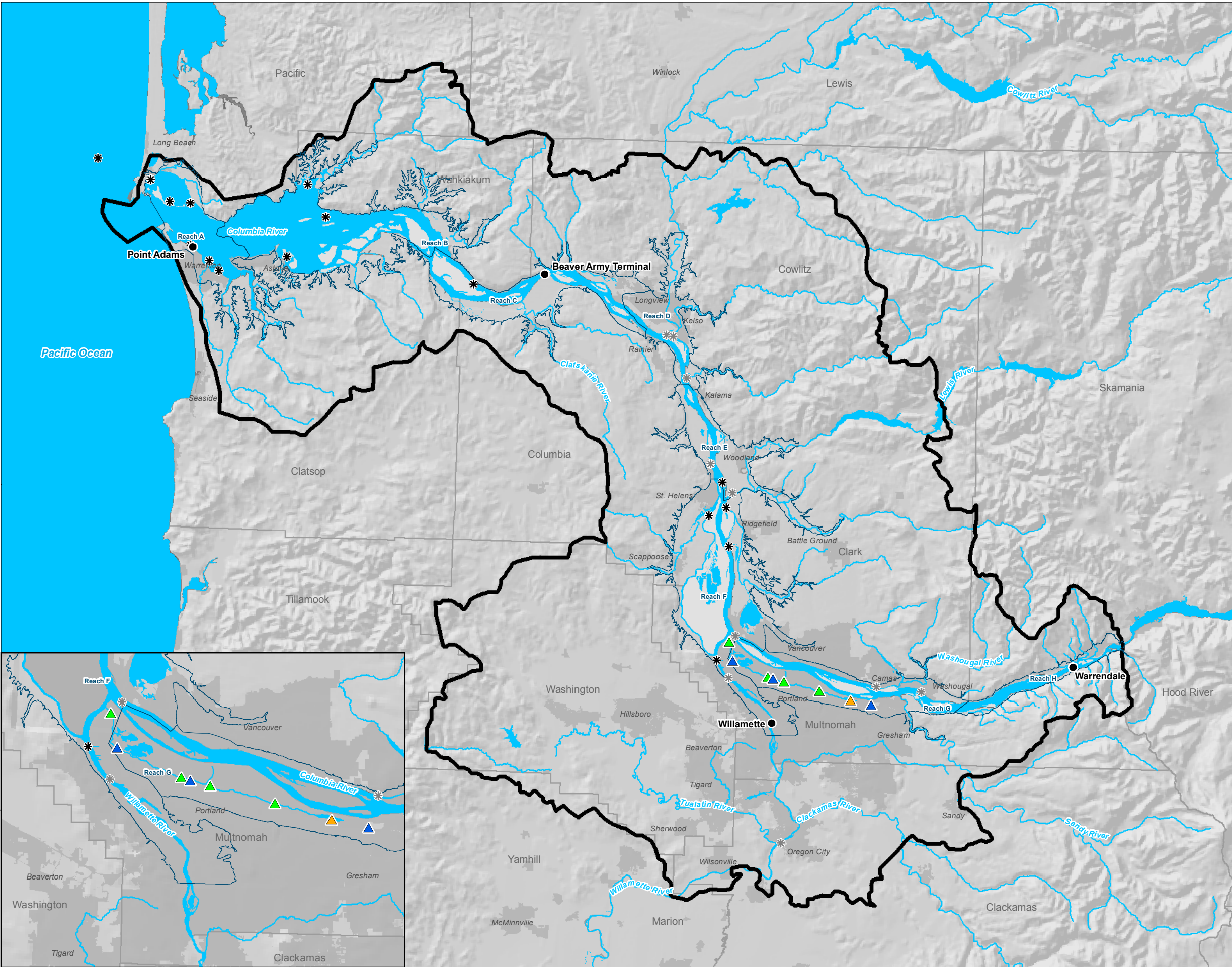
- USGS SPMD Sample Location
- Sample Location, Grab**
  - ▲ Detect
  - △ Non-Detect
- Total DDX (ng/SPM)**
  - ▲ 0 - 30
  - ▲ 30 - 60
  - ▲ > 60
- Proposed Monitoring Sites (1999)**
  - \* Suspended Sediment
  - \* Streambed Sediment
- All Other Data**
  - ▭ Study Area
  - ⦶ River Regions
  - ▭ Counties
  - ▭ City Limits
  - ~ Watercourses
  - ~ Waterbodies

Site	Date	Result	Qualifier	Unit
Warrendale	20-Apr-05	Trace		ng/SPMD
Beaver Army Terminal	21-Apr-05	800	U	ng/SPMD
Point Adams	18-Apr-05	Trace		ng/SPMD



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG



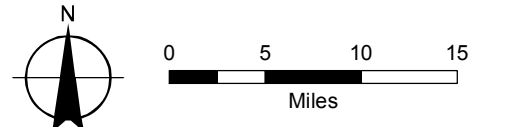
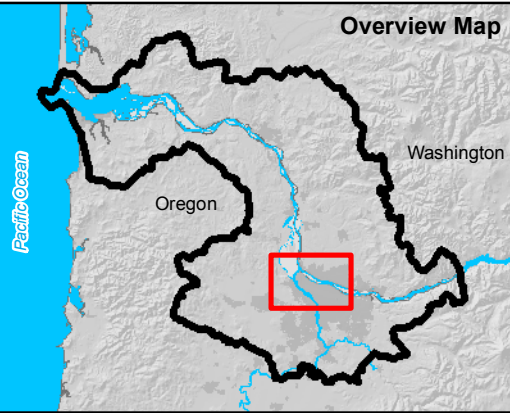


**FIGURE 21**  
**Total DDx in SPMDs, August 2005**  
Lower Columbia River Estuary Partnership

**LEGEND**

- USGS SPMD Sample Location
- Sample Location, Grab**
  - ▲ Detect
  - △ Non-Detect
- Total DDx (ng/SPM)**
  - ▲ 0 - 30
  - ▲ 30 - 60
  - ▲ > 60
- Proposed Monitoring Sites (1999)**
  - \* Suspended Sediment
  - \* Streambed Sediment
- All Other Data**
  - ▭ Study Area
  - ⬭ River Regions
  - ▭ Counties
  - ▭ City Limits
  - ~ Watercourses
  - ~ Waterbodies

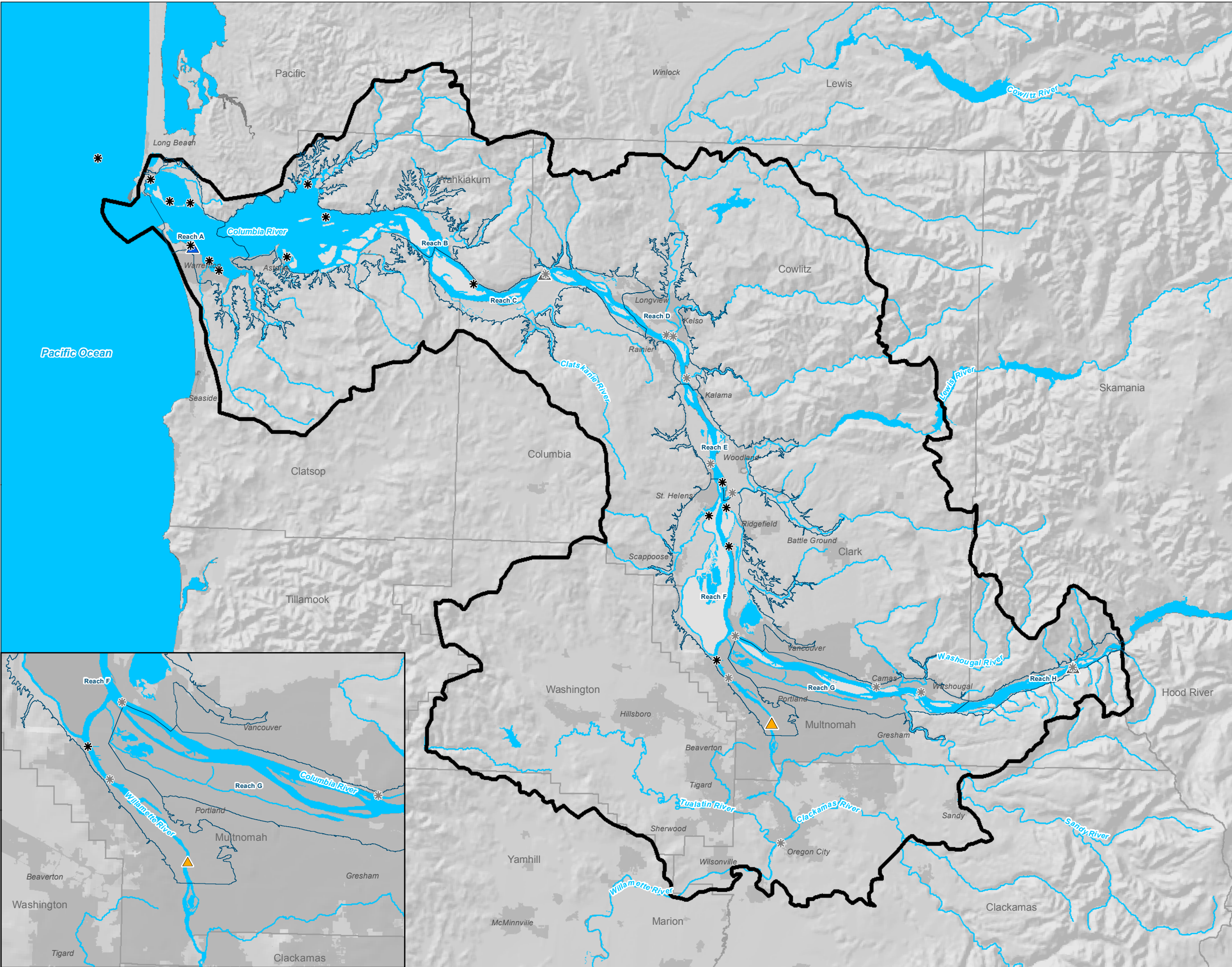
Site	Date	Result	Qualifier	Unit
Warrendale	8/8/2005	800	U	ng/SPMD
Warrendale	8/8/2005	800	U	ng/SPMD
Willamette	8/8/2005	800	U	ng/SPMD
Beaver Army Terminal	8/9/2005	800	U	ng/SPMD
Point Adams	8/11/2005	Trace		ng/SPMD



**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG

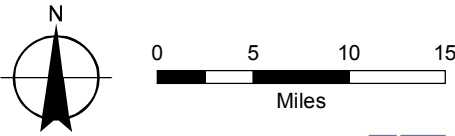
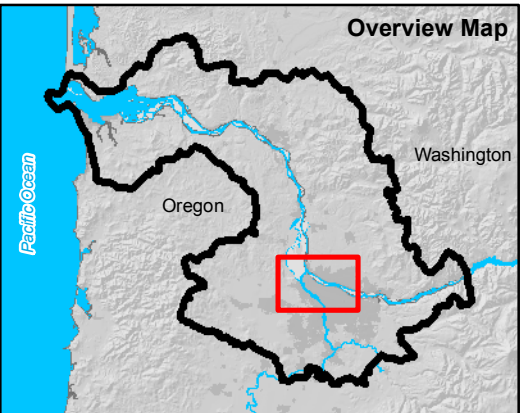
**GSI**  
Water Solutions, Inc.





**FIGURE 22**  
**PBDE 47 in SPMDs, March - April 2005**  
Lower Columbia River Estuary Partnership

- LEGEND**
- Sample Location, Grab**
- ▲ Detect
  - △ Non-Detect
- PBDE 47 (ng/SPM)**
- ▲ Trace
  - ▲ 0 - 30
  - ▲ 30 - 60
  - ▲ > 60
- Proposed Monitoring Sites (1999)**
- \* Suspended Sediment
  - \* Streambed Sediment
- All Other Data**
- ▭ Study Area
  - ⬭ River Regions
  - ▭ Counties
  - ▭ City Limits
  - ~ Watercourses
  - ~ Waterbodies

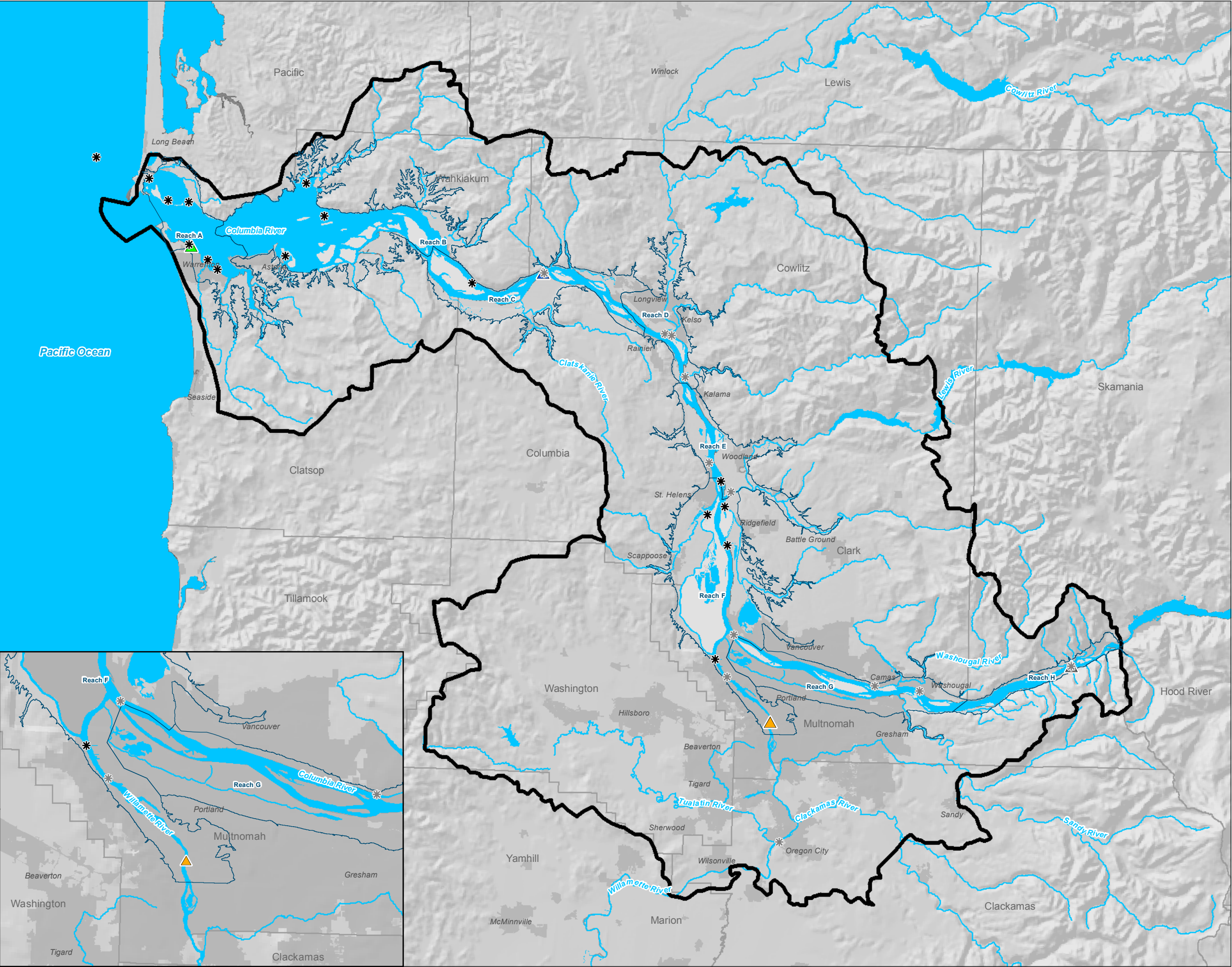


**MAP NOTES:**  
Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG





**FIGURE 23**  
**PBDE 47 in SPMDs, August 2005**  
Lower Columbia River Estuary Partnership



**LEGEND**

**Sample Location, Grab**

- ▲ Detect
- △ Non-Detect

**PBDE 47 (ng/SPM)**

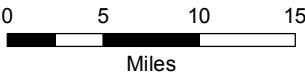
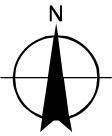
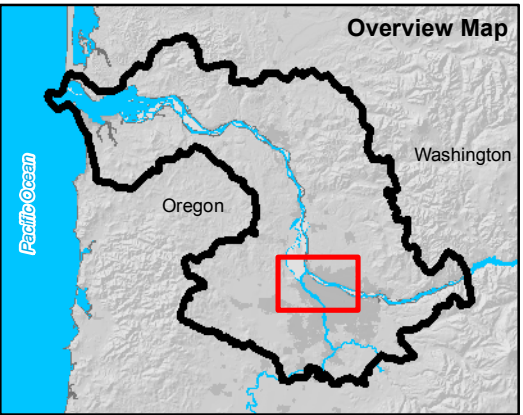
- ▲ Trace
- ▲ 0 - 30
- ▲ 30 - 60
- ▲ > 60

**Proposed Monitoring Sites (1999)**

- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

- Study Area
- River Regions
- Counties
- City Limits
- Watercourses
- Waterbodies

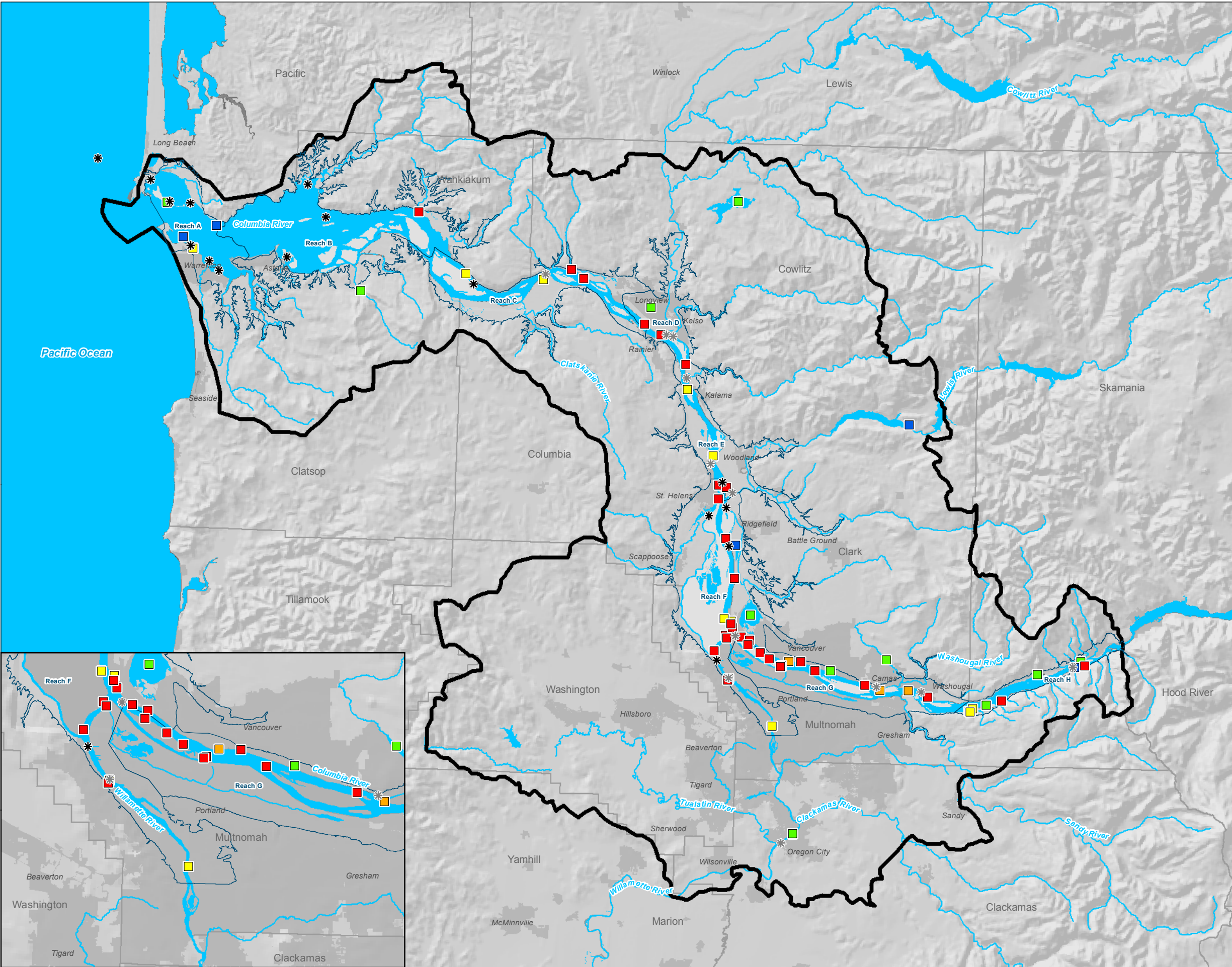


**MAP NOTES:**

Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG







**FIGURE 24**  
**Total PBDEs in Biological Samples**  
Lower Columbia River Estuary Partnership

**LEGEND**

**Sample Location**

- Detect
- Non-Detect

**Total PBDEs (ng/kg)**

- 0 - 4,000<sup>1</sup>
- 4,001 - 40,000<sup>2</sup>
- 40,001 - 400,000<sup>3</sup>
- 400,001 - 4,000,000<sup>4</sup>
- > 4,000,000

**Proposed Monitoring Sites (1999)**

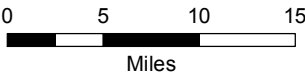
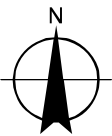
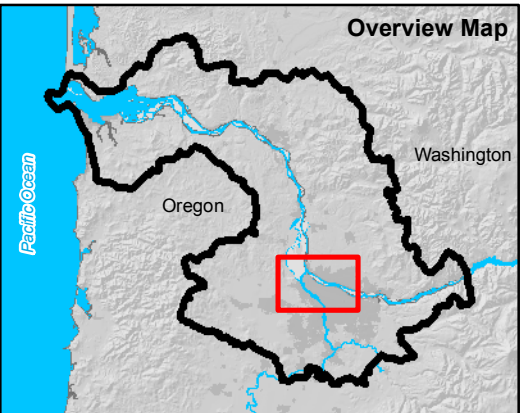
- \* Suspended Sediment
- \* Streambed Sediment

**All Other Data**

- Study Area
- River Regions
- Counties
- City Limits
- Watercourses
- Waterbodies

**NOTES**

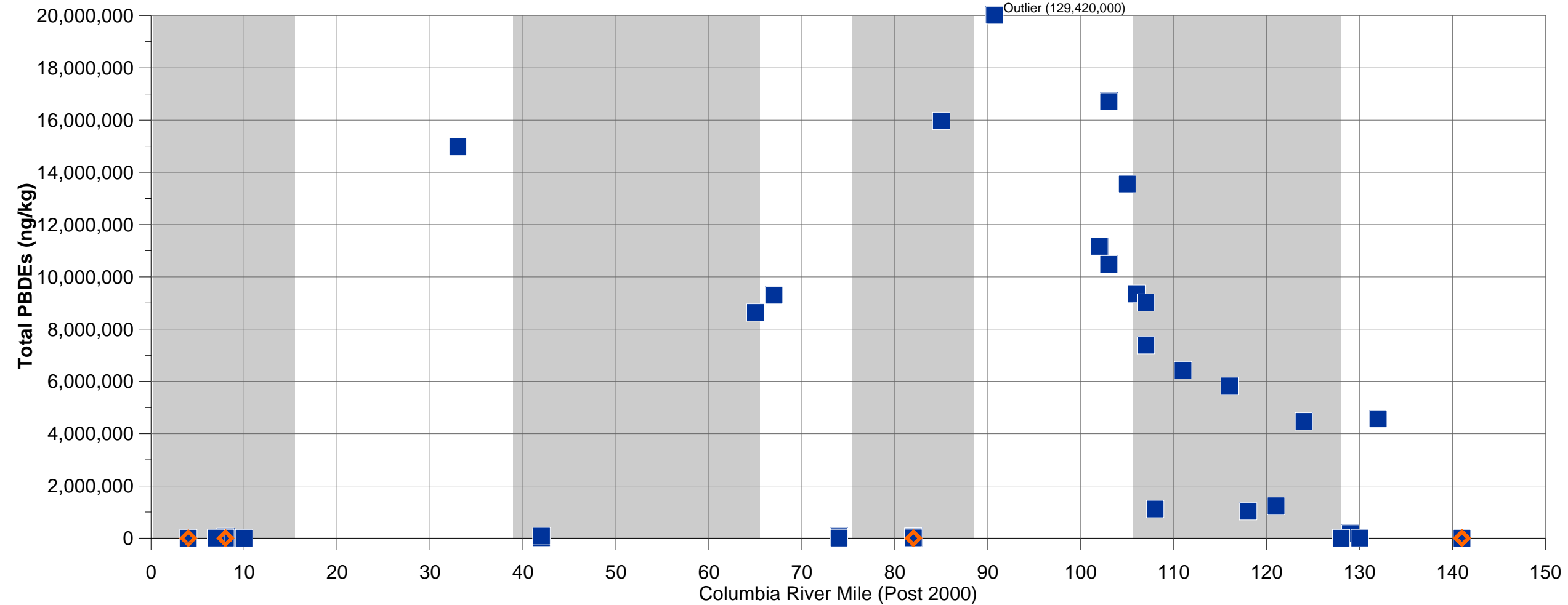
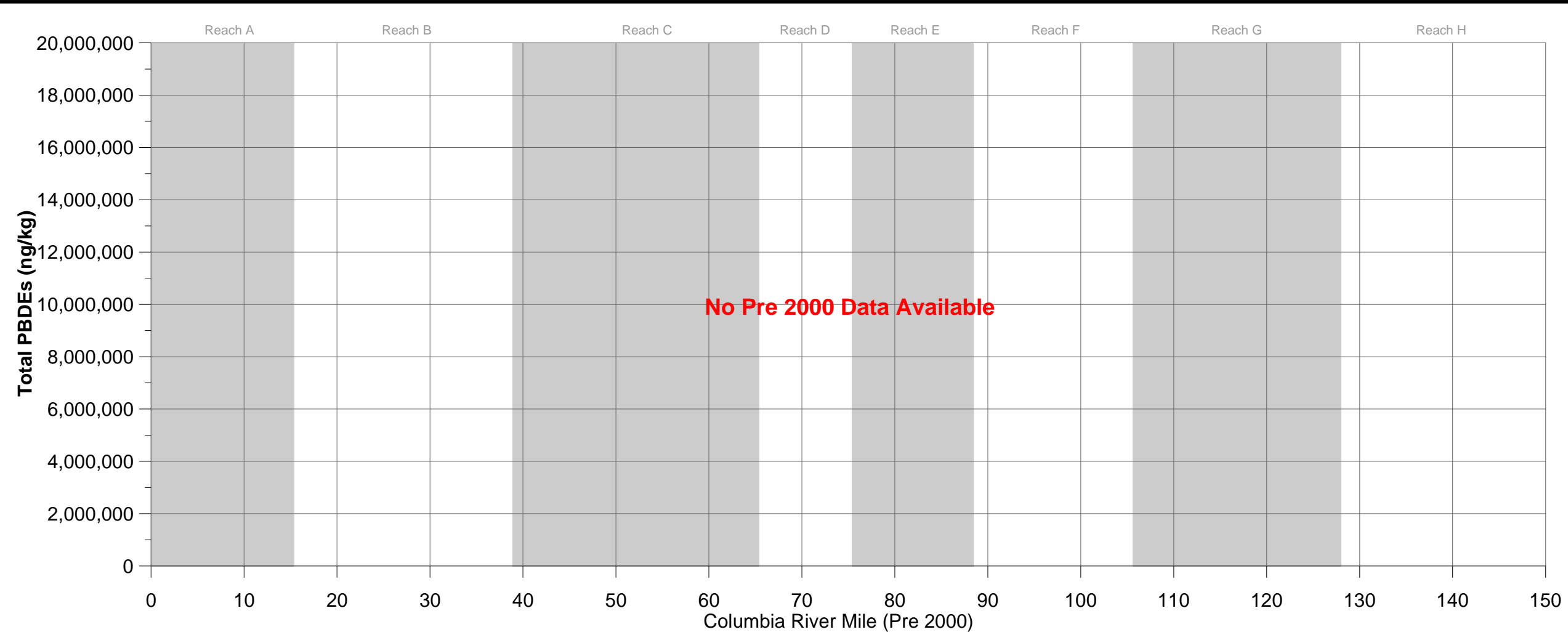
1. Natural break
2. PH RI/FS Fish Consumption rate of 175 g/day
3. PH RI/FS Fish Consumption rate of 17.5 g/day
4. Natural break



**MAP NOTES:**

Date: August 4, 2011  
Data Sources: ESRI, LCREP, USGS, NOAA, EPA, DEQ, DOE, LWG





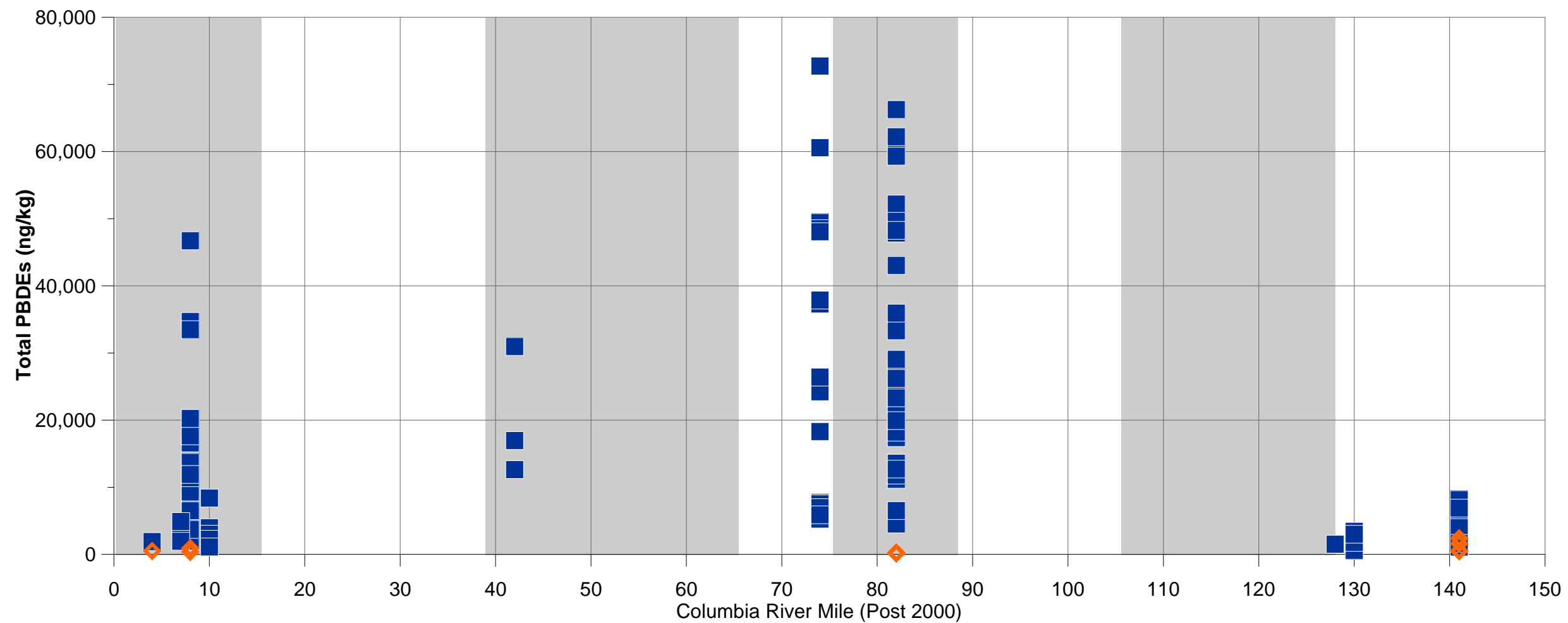
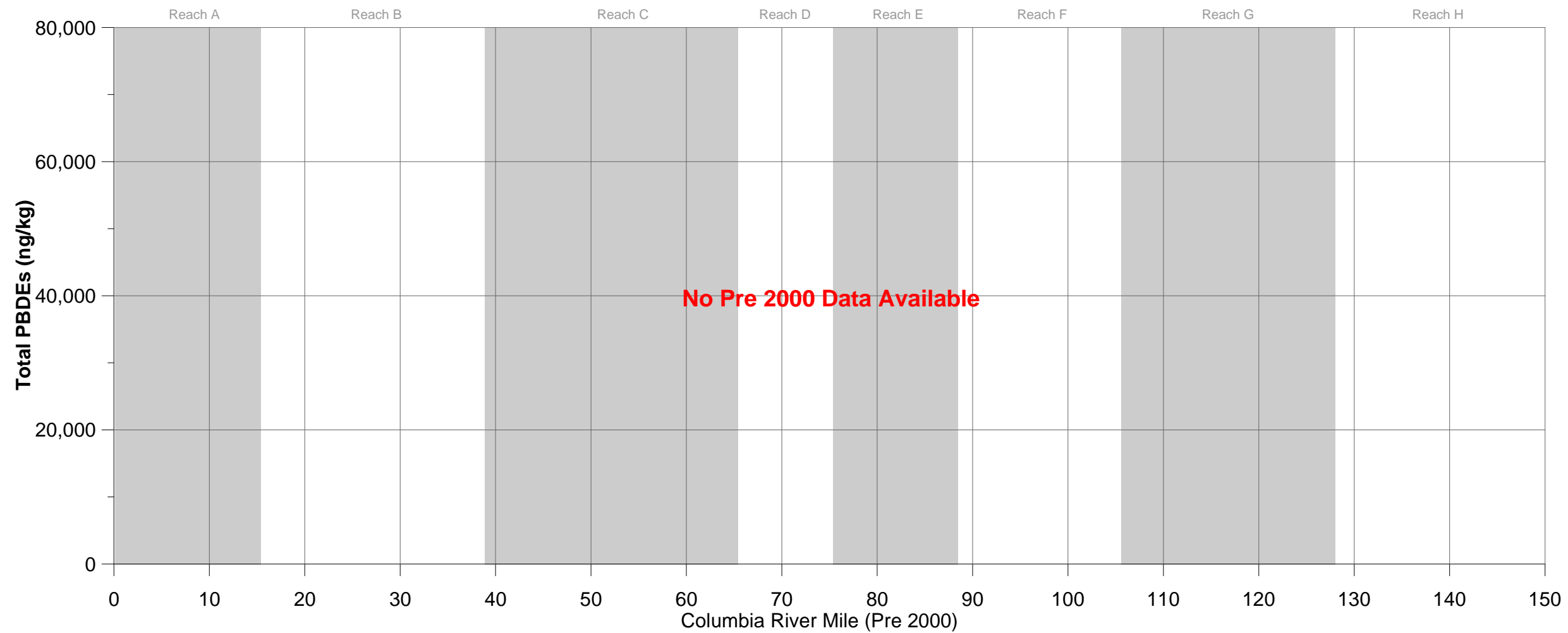
**FIGURE 25a**  
 Total PBDEs in Biological Samples  
 on the Columbia River  
 Lower Columbia River  
 Estuary Partnership

**Legend**  
 ■ Detect  
 ◇ Non-Detect

**Note:**  
 River miles and reaches are  
 approximate  
 Date: August 2011







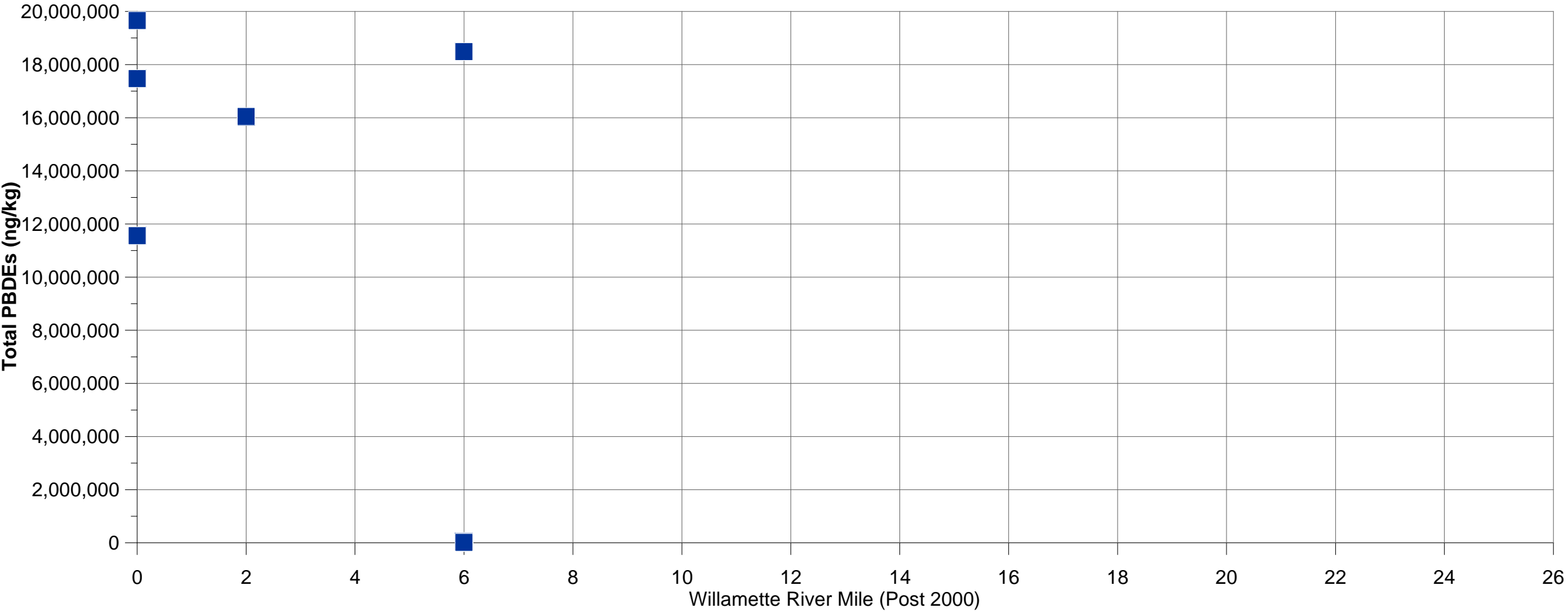
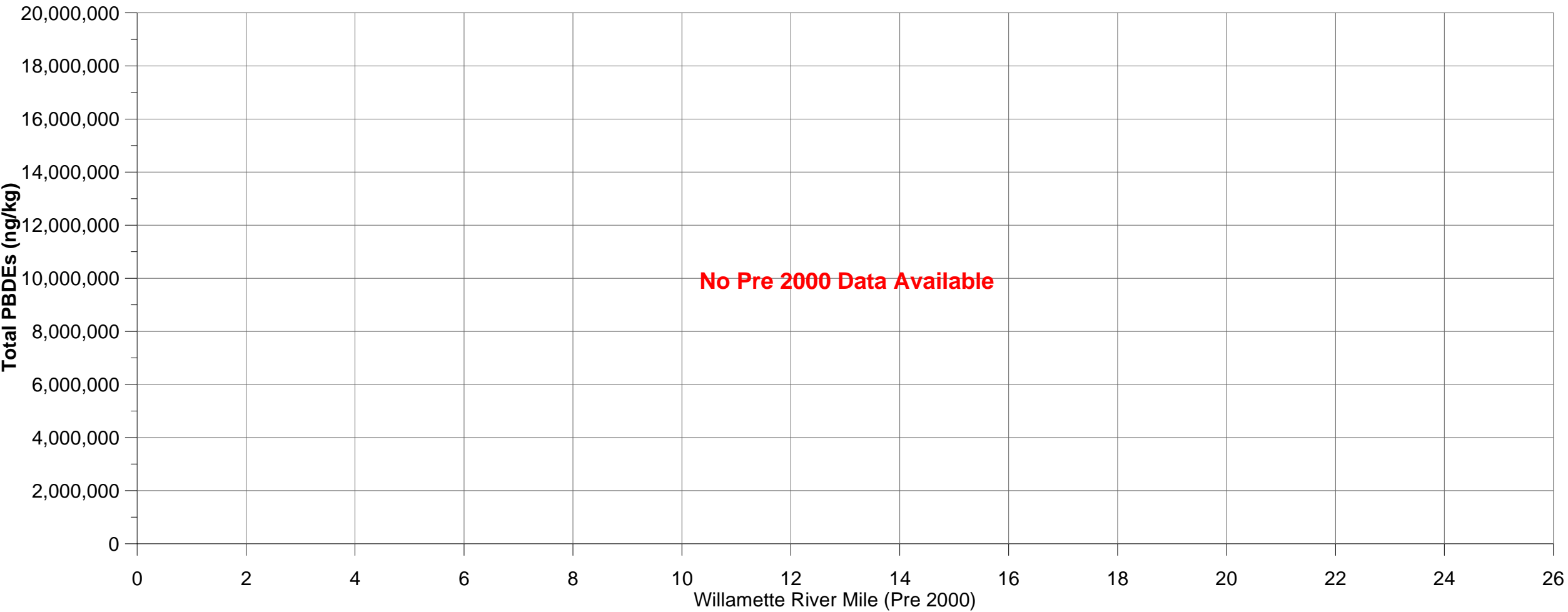
**FIGURE 25b**  
Total PBDEs in Biological Samples  
on the Columbia River  
Lower Columbia River  
Estuary Partnership

**Legend**  
■ Detect  
◆ Non-Detect

**Note:**  
River miles and reaches are  
approximate  
Date: August 2011



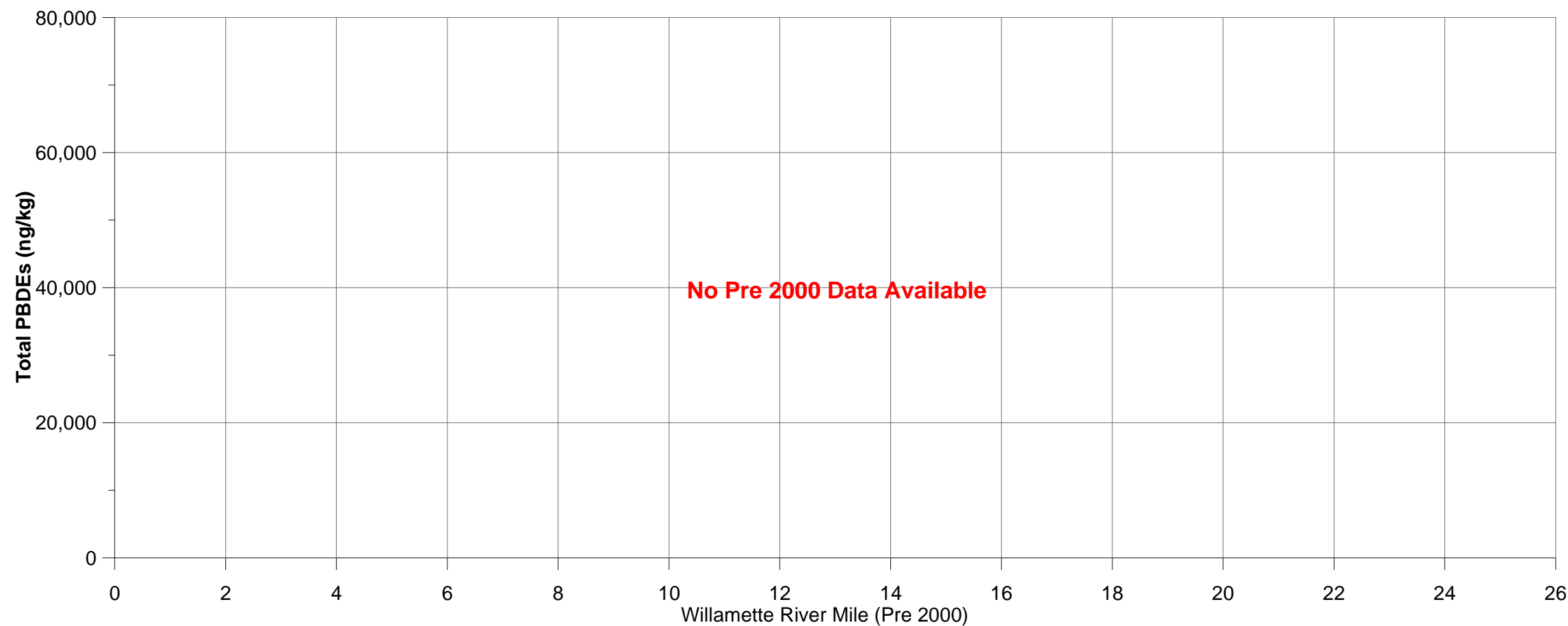
FIGURE 26a  
Total PBDEs in Biological Samples  
on the Willamette River  
Lower Columbia River  
Estuary Partnership



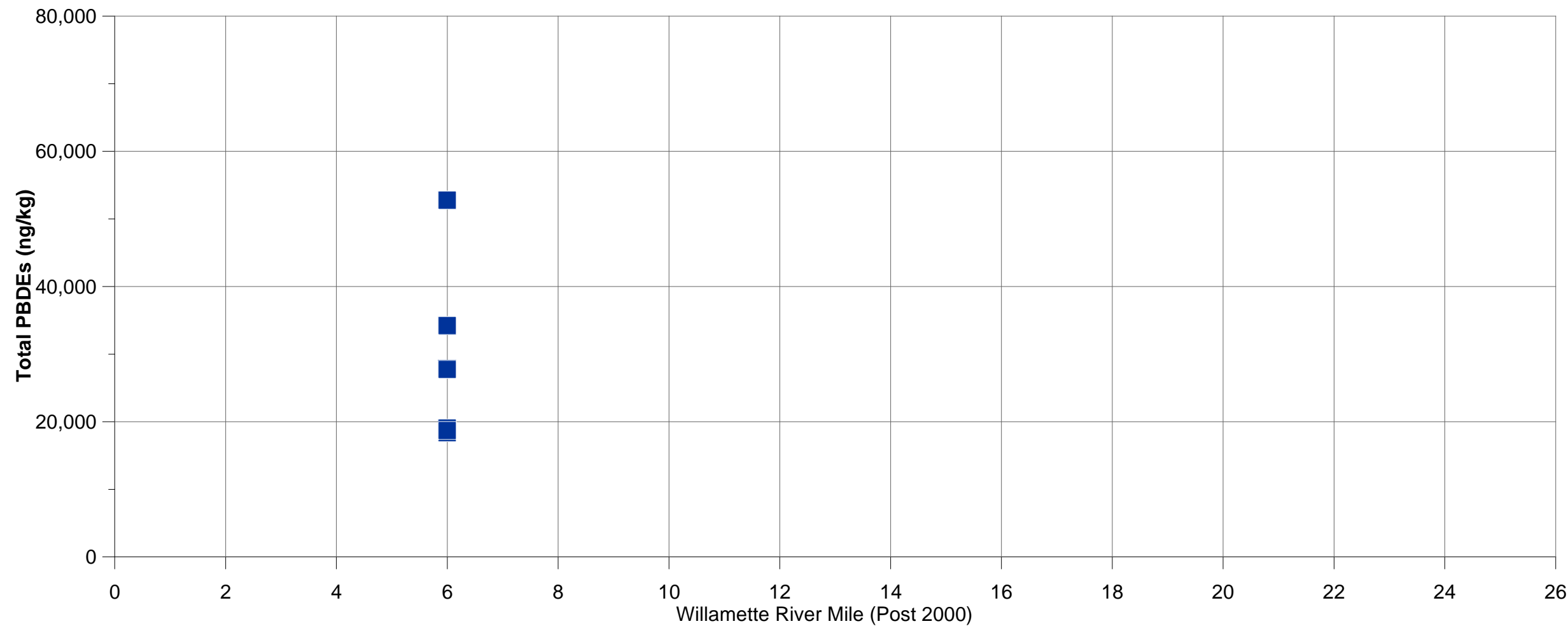
**Note:**  
River miles are approximate  
All data in Reach F  
Date: August 2011



**FIGURE 26b**  
Total PBDEs in Biological Samples  
on the Willamette River  
Lower Columbia River  
Estuary Partnership



**Legend**  
Detect  
Non-Detect



**Note:**  
River miles are approximate  
All data in Reach F  
Date: August 2011

